Service Manual

A Clinical Information System

QUANTITATIVE SENTINEL®

REF 2002033-023

Revision A

GE Medical Systems
Information Technologies

gemedical.com

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CE Marking Information

COMPLIANCE

The Quantitative Sentinel (QS) product bears the CE Mark

indicating its conformity with the provisions of the Council Directive 93/42/EEC concerning medical devices and fulfills the essential requirements of Annex I of this directive.

EXCEPTIONS

Users should be aware of known RF sources, such as radio or TV stations and hand-held or mobile two-way radios, and consider them when installing a medical device or system.

Be aware that adding accessories or components, or modifying the medical device or system may degrade its EMI (electromagnetic interference) characteristics. Consult with qualified personnel regarding changes to the system configuration.

REVISION HISTORY

The following table summarizes this manual's revision history by providing the revision label, effective date, QS software version and comments appropriate for each release.

Table of Revision History

Revision	Date	QS Version	Comments
A	March 2003	6.60.0	Initial Release

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PREFACE

INTRODUCTION TO THE QUANTITATIVE SENTINEL (QS)

The QS Clinical Information System (CIS) is designed to automate record keeping in medical facilities such as intensive care units (ICUs), operating rooms (ORs), obstetrical/gynecological (OB/GYN) units, and units operating on the general floor. The **QS Designer** enables individual medical organizations to easily configure their systems to meet specific data management requirements without the assistance of experienced medical programmers. Use of the QS Designer should be limited to the institution's assigned System Manager(s).

User Interface

Microsoft's Windows® operating system provides the user interface for the QS. This interface allows the use of function keys, icons, and menus to facilitate user direction of system operations. Scrollable windows provide access to the various screen displays and user dialogs necessary for data entry, storage, and retrieval. User interaction with the QS may be accomplished through a variety of devices such as keyboards, mice, and trackballs.

Interface Customization

System Managers may customize the operation of the QS to meet the specialized needs of different clinical users. This is accomplished through the definition of *Views* that exhibit unique display formats, specialized collections of charts and forms, etc. View definition also allows the System Manager to provide specific forms of navigation (toolbars, menus, tab control navigators, and functions keys) through the QS that are specifically tailored to meet the needs of individual user groups. Users who have a wide range of responsibilities may be assigned multiple views; this will allow selection of the view best suited for the clinical environment in which they are functioning at any point in time. Views may be defined for environments such as *operating rooms*, *intensive care units*, *labor and delivery units*, *neonatal intensive care units*, etc. As user experience and expertise grow, you should solicit their inputs about special clinical needs (new or modified charts, forms, function key assignments, etc.) so that you may better refine the operational capabilities of currently defined view(s) and create new ones as the need presents itself.

Supported Interfaces

The QS employs Microsoft and IBM supported software architectural standards, an IBM-compatible microcomputer platform, and standard off-the-shelf network hardware and software products. Adherence to industry standards allows the QS to easily connect to and acquire data from existing hospital information systems (**HIS**) and laboratory information systems (**LIS**).

USER BACKGROUND

The intended users of this manual are facility staff members who have been tasked with maintaining the operation of the QS.

DISCLAIMERS

Disclaimers have been stated below to clarify the intent of this manual's content and the manner of its presentation. These statements address system operational considerations, design changes, reproduction rights, and the use of patient data as defined in the paragraphs that follow.

Data Collection

The QS is not intended to replace the patient information obtained from patient monitoring equipment with which it is interfaced; rather, it should be employed as a supplemental device that allows the clinical staff to enter, store, retrieve, and view data in a more efficient yet flexible manner.

Design Changes

Due to design changes associated with continuing product improvements, information in this manual is subject to change. GE Medical Systems *Information Technologies* (hereafter referred to as **GE**) reserves the right to change software design at any time and any such changes could affect the contents of this manual. GE assumes no responsibility for any errors or inconsistencies appearing in this manual that result from product design changes and upgrades.

Patient Care

Operation of the QS should neither circumvent nor take precedence over required patient care, nor should it impede the human intervention of attending nurses, physicians or other medical personnel in a manner that would have a negative impact on patient health.

References to Persons, Places, and Institutions

References to persons, places, and institutions used within this manual are solely intended to facilitate user comprehension of the QS's use and functions. Extreme care has been taken to use fictitious names and related information in the examples and illustrations provided herein. Any similarity of this data to persons either living or dead and to either current or previously existing medical institutions should be regarded as coincidental.

Reproduction Rights

No part of this manual may be reproduced, stored in a retrieval system, or transmitted in any form or by any means - electronic, mechanical, photographic, etc. - without the prior written permission of GE. All inquiries regarding this manual and/or the Quantitative Sentinel System should be directed to GE.

SAFETY SUMMARY

WARNINGS, CAUTIONS, AND NOTES

Warnings, *cautions*, and *notes* appear throughout this manual as preventive instructions designed to (1) ensure the safety of individuals using or in close proximity to the QS, and (2) safeguard the integrity and condition of the equipment and software employed by the system. These preventive instructions are presented and defined below. This manual should be (1) mandatory reading for all QS System Managers, (2) placed in a convenient location to facilitate its use as a reference, and (3) employed as orientation material for prospective QS System Managers. This section of the manual also summarizes documentation symbols found within this manual.

General Definitions

The significance of *warnings*, *cautions* and *notes* is generically discussed below. Considerations that generally apply throughout this manual are summarized in a subsequent paragraph.

WARNINGS ..... provide the user with instructions intended to prevent the occurrence of mishaps that could result in either injury or loss of life. *Warnings* will always precede the instructions that possess the potential for human injury.

CAUTIONS ..... provide the user with instructions intended to prevent the occurrence of mishaps that could result in damage to system equipment/software. *Cautions* will always precede the instructions that possess the potential for equipment damage.

NOTES ..... provide the user with instructions intended to prevent inappropriate actions that will result in neither human injury nor equipment damage. The cost associated with failure to observe a procedural note will typically be in wasted time and effort. *Notes* will always precede the instructions that possess the potential for procedural error.

QS Safety Summary

Warnings and cautions that are generally applicable to the various configurations of the QS, as exemplified in this manual, are summarized as follows:

Potential Electrical/Mechanical/Physical Hazards

WARNINGS

CONDUCTIVE HAZARD – Do not use adapters or make plug modifications to equipment power cords.

ELECTRICAL SHOCK HAZARD – Do not operate equipment when moisture or liquids are present on any equipment surface.

FIRE HAZARD – Do not operate electrical/electronic devices such as computer workstations, power supplies, etc. within enclosed spaces. Sufficient ventilation must be maintained if these devices are to operate properly, realize their advertised service lives, and not overheat or catch fire.

FIRE HAZARD – Adequate cooling of electrical/electronic devices such as computer workstations, power supplies, etc. require unrestricted air flow to operate properly, realize their advertised service lives, and not overheat or catch fire. Cooling vents and fan openings should be periodically inspected for signs of debris buildup (lint, dust, etc.) and cleaned/vacuumed whenever buildup is observed.

EXPLOSIVE HAZARD – Do not operate equipment in the presence of flammable anesthetics or inside an oxygenated environment.

INFECTION HAZARD – Do not omit QS equipment from established cleaning/disinfecting procedures appropriate for the environments at your facility. Failure to do so could expose patients, staff members, etc. to unnecessary risk of infection.

PHYSICAL HAZARD – Do not modify physical placement/connection of QS equipment. Improper stowage could result in physical instability and possible injury to user/patient.

CAUTION

CONDENSATION HAZARD – Do not operate equipment recently subjected to environmental variations in temperature and humidity. The potential for accumulation of internal condensation could result in equipment damage.

Internet/Intranet Considerations

WARNING

DATA ACCURACY – Users should always verify clinical data retrieved from (provided by) internet/intranet sites accessed via the QS URL capability. The content/operation of the various displays (e.g. pages) is the responsibility of the authors/owners of the individual internet/intranet sites.

GE neither guarantees nor assumes any responsibility for the content of the displays provided by individual sites or the accuracy of the information that they provide.

Surveillance/Monitoring Concerns

CAUTIONS

DATA INTERPRETATION – Users should be aware of the operational characteristics of *QS Fetal Surveillance Alerts* (*Hi/Lo Notifications* & *Spectra*). Users should familiarize themselves with the audio/visual indications associated with the alerts feature employed at their site prior to use – refer to the ***FHR Notifications Guidelines*** or ***Spectra Alerts - Overview*** information sheets contained within this manual. Failure to review this material could result in misinterpretation of fetal (maternal) conditions.

MONITOR DIFFERENCES – Users should be aware of fetal monitor characteristics as they are interpreted for display by the QS. In general, *thick lines on the paper strip* correspond to 'red' lines on the QS strip; while, *thin lines on the paper strip* correspond to 'black' lines on the QS strip. Users at institutions using fetal monitors from different manufacturers should be aware of this QS operational characteristic.

TIME SYNCHRONIZATION – Users and members of the Biomedical Engineering staff should be aware that **the time on the monitor must be synchronized with the time on the QS**. Time synchronization between all devices and QS workstations (servers and clients) is critical. Anomalies will result if synchronization is not maintained. The user may see anomalies such as:

- Charting irregularities with the recorded time of clinical data entry (modify time).
- Fetal strips that restart when workstation displays are refreshed.
- PDATS (QS patient data server) exhibits storage errors.
- Monitored data is not stored when special procedures (*non-invasive blood pressure* and *cardiac output*) are performed.

Erroneous Data Entry/Calculations

NOTES

DATA COMPUTATION – The QS may compute data values based upon data entered by the clinical practitioner and the formula provided by the QS System Manager. Failure to ensure (1) accurate data entry and (2) correct formula definition could result in the generation of inaccurate computations.

DATA ENTRY – Be sure that the desired patient is selected before performing data entry via charts, chalkboards, etc. Failure to make the desired patient the focal point of data operations could result in the data being placed into another patient file.

DRUG COMPUTATIONS – Clinical users should ensure that correct data values are entered for the QS Compute function. Failure to comply with this requirement could result in an incorrect recommendation of drug rate/dose.

FILE MERGING – Although the QS patient merge mechanism is a relatively simple process, the clinical user should pay close attention to (1) patient selection and (2) data sources for each of the indicated data items. Failure to comply with this direction could result in an output file containing data from inappropriate sources (patients).

MULTIPLE PATIENTS – Clinical users should be aware that multiple patients can be assigned to the same bed if (1) a patient location dialog box (used for admission, discharge, and transfer functions) is open, and (2) another user or process (such as an ADT interface) makes an assignment to the same bed prior to that dialog box being closed. Failure to observe/correct this situation result in data being placed into the wrong patient file. For this reason, you should verify patient location (via the QS roster display) after a transfer, admission, or discharge. If multiple patients are listed for a bed, you should either (1) relocate the incorrectly placed patient or (2) merge the patient files if the situation resulted from a single patient having been assigned an erroneous ID.

PATIENT IDENTIFICATION – Be sure that the patient who previously occupied a specific bed has been discharged (placed in a unit Hold bed) before recording/monitoring data on the next patient placed in that bed. Failure to conform to this requirement could result in data being placed into the wrong patient file.

TYPOGRAPHICAL ERRORS – Although the QS may be configured to ensure that numeric data (pulse, BP, temperature, etc.) is within a specified range of acceptability, users may make typographical errors when entering data. Failure to verify your manually entered data could result in the storage of incorrect data.

Security Considerations

NOTE

SYSTEM SECURITY – The QS provides the capability to define the degree of user access to QS workstations via the use of IDs and passwords. It also allows the assignment of READ/WRITE privileges to determine who may access/record patient data on a per item basis. Failure to properly configure the QS security feature could result in unauthorized personnel gaining entry into the QS and ultimately viewing/recording patient data.

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Chapter 1

QS System Overview

QS DESCRIPTION

The QS system is a software application that operates on industry standard, off-the-shelf software and computer/network hardware. It is a form of application software commonly referred to as a *clinical data management system* or *clinical information system*. The primary focus of this type of software is to provide a data management tool that allows medical institutions to define electronic charts and forms similar to their paper counterparts, to manually enter or automatically acquire, display, store and retrieve patient and clinical practice information.

Capabilities

The primary or general purpose of the QS is to provide automated patient data entry. It accomplishes this by:

1. Allowing creation and use of electronic charts and forms for entering, storing, retrieving, and viewing patient/facility related data (e.g. charts, forms, graphs, chalkboards, user reference manuals, medication administration records).
2. Interfacing with other hospital information systems and medical devices for select, automatic data acquisition, viewing and storage with the electronic patient record.
3. Providing visual notification of when acquired fetal monitor heart rate values exceed the user defined limits for high and low fetal heart rate and poor signal quality.
4. Providing Spectra Alerts capabilities for fetal monitoring (surveillance).
5. Recording acquired fetal monitor data with patient record.
6. Providing automatic computations of physiological indices.
7. Providing calculations from user defined formulas.
8. Providing the ability to record, with the patient record, fluid input and output information that is defined by the user.
9. Providing the ability to export patient data to a relational database for research, reporting and quality assurance purposes.
10. Providing the ability to archive files to a secondary or a tertiary storage medium.
11. Providing the ability to print.

Intended Users of the QS

Intended users nurses, nurse managers, physicians as well as other licensed care providers and trained/ site authorized personnel with system configuration and maintenance responsibilities

User Environment

The QS is intended for use in a hospital or other clinical setting.

Patient Applicability

Access to the patient population is restricted to only those patients within units configured for use with the QS.

Users should note that:

- The QS is not connected directly to any patient;
- The QS is not intended to replace the patient information obtained from patient monitoring equipment with which it is interfaced.
- Use of the QS should not circumvent or take precedence over required patient care.

HIPAA Conformance

GE Medical Systems is aware that complying with the Health Insurance Portability and Accessibility Act (**HIPAA**) is a top priority as you work to meet transaction, security and privacy regulations. Because these new regulations are an important step forward in protecting patient's privacy and improving efficiency within the healthcare industry, GE is actively engaged in providing information to help you identify and resolve many of the patient care and business issues you may face as you implement actions to comply with HIPAA.

You are encouraged to access the Internet URL listed below for the **most recent information** about our commitment to HIPAA:

http://www.gemedicalsystems.com/it_solutions/hipaa/statement.html

QS FEATURES

The following paragraphs describe available QS features. Please note that some features are optional and only available if specifically purchased.

Manual Patient Data Recording

User will generally enter data via electronic charts, forms, and/or chalkboards using a computer keyboard. Although default charts, chalkboards and forms are provided for the QS, the QS Designer tool provides appropriately trained site personnel to create their own or modify duplicates of the default items to better suit the needs and requirements of their specific facility.

Clinically-related charts and forms may be combined into an appropriately labeled display group to allow users to access the complete complement of charts suitable for the clinical tasks for which they are responsible.

Charts

An electronic version of the traditional paper charts that clinicians once used to record patient information. QS charts appear on the computer workstation display monitor and generally take the form of tabular charts and flowsheets. Generally used to record recurrent data such as temperature, blood pressure, etc., QS charts provide the maximum amount of patient information within a given display.

Forms

Forms are generally used to record data that does not vary with time. Demographic information such as patient name, sex, date of birth, etc. is well suited for collection/display by QS forms.

Chalkboard

Similar to the white-boards used within individual hospital units to display patient (bed) status, attending physician, lab results and other hospital defined information. The QS chalkboard offers the advantage of being periodically updated with the latest data within the patient record.

MAR (Medication Administration Record)

The MAR allows transcription of medication and fluid orders into the QS using dedicated displays and predefined order templates. Currently, there are four displays associated with the MAR - a MAR display, an I&O Summary display, an Interventions display, and an Order Summary display.

Automated Patient Data Recording

Patient data may be automatically acquired from other hospital information systems and/or devices that are interfaced with the QS system. The acquired data is automatically entered and saved with the appropriate patient file(s) and may be subsequently retrieved for viewing within QS charts, forms and chalkboards. Automated data recording combined with manual data entry allows the QS to maintain a comprehensive patient record.

Hospital Information Systems (HISs)

Automated information transfer (receipt and transmission) is possible if the QS is networked with laboratory, ADT (admit, discharge and transfer), or other information systems. User specified data is acquired from the respective system(s) and is generally unidirectional in that it travels from the HIS system to the QS database. In some configurations, equipped with the HL7 Outbound feature and/or Spacelabs Ultraview Gateway, the QS will serve as either the source of information or a request for information. The QS interface conforms to the HL7 standard - an application level specification for electronic data exchange in healthcare environments.

Devices

The QS is able to acquire data from physiologic monitors and bedside devices equipped with the ability to send data to another system (e.g. via RS-232 connection). Data flow is essentially unidirectional from the device to the QS (except for configurations making use of the Lab Access Server or Unity Time Synchronization). The QS provides no controls to the interfaced monitor or device. Device interfaces are consistent with the data transmission protocol established by the device manufacturer. These protocols are governed by industry standards for data transmission. The acquired data is in the form of parametric data (e.g. blood pressure values) or waveform data. Acquired data recorded within the electronic patient record is available for historical review as well as real-time surveillance capability (fetal monitor waveform data only).

Fetal Heart Rate (FHR) Notifications

Sites may choose to use either of two available forms of fetal surveillance.

One, **FHR Notifications** provides both visual and audible indications that a monitored fetal heart rate (FHR) is either above (high) or below (low) site/user defined limits or missing (poor signal quality). These indicators are based upon parameters acquired directly from the interfaced monitor.

The other, **Spectra Alerts** analyzes FHR and uterine activity (UA) using a set of sophisticated internal algorithms to determine the type and level of alert appropriate for the current fetal state. When appropriate, the QS will generate both visual and audible alerts appropriate for the evaluated fetal state.

Printing and Faxing

Patient information (e.g. tabular charts, flowsheets and forms) as well as system configuration data (used to define the QS operation as well as item, chart, and form definitions) may be printed either on receipt of a user initiated demand or in accordance with a predefined printing schedule. The printed output may be sent to any properly printer or fax machine (optional) configured to work with the QS.

Index Calculator

The index calculator permits users to enter formulas and perform mathematical and scientific calculations.

Compute

Compute consists of preset formulas that permit the user to perform nutrition, and drug related calculations. The formulas are based on known, published formulas.

On-line Help

On-line help allows users to access information about a particular QS operation or feature. This is similar to the Help feature in common software applications like Microsoft Word.

Security

Password, login requirements, validation requirements and assigned service categories are defined by the site's System Manager(s).

Export

This feature permits the export of ASCII formatted patient data into a relational database (MS Access) for quality assurance, reporting and research purposes. Operation of the relational database is separate from the QS system.

Archive

Archive permits patient data (files) to be permanently saved to an alternative storage medium (currently CD-R).

QS ARCHITECTURE

Figure 1 shows the QS in the context of a typical hospital system. Healthcare providers interact with the user interface to review and modify patient data and system configuration data. ADT, Lab, and bedside physiological monitors send data to the QS which incorporates it into the electronic patient data record. OB Link is a web-based solution to deliver and display fetal trace data and other patient data to remote client web browsers through the Windows Internet Information Server (IIS).

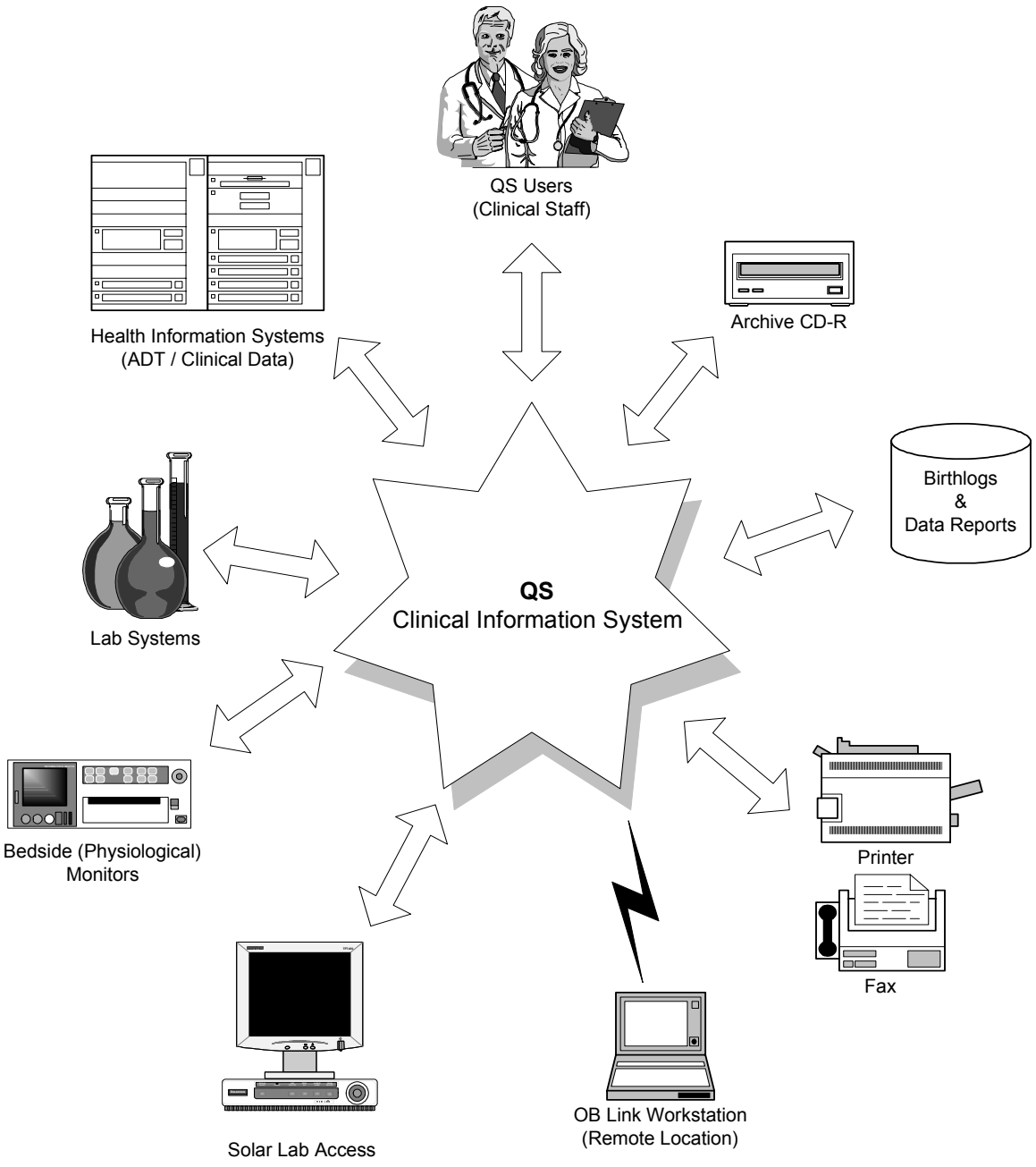

Figure 1: QS Context Diagram

The Solar Lab Access (SLA) interface allows for laboratory results to be sent to GEMS Solar 8000 or Dash 3000 monitors on the Unity network for display. Patient data can be stored on long-term storage media for future retrieval, and may be exported to a third party database for cross-patient analysis. Patient and system configuration data can be sent to printers either on demand or through performance of scheduled print jobs.

Figure 2 shows the major patient data interactions in the QS. Patient data can be charted or reviewed via the primary user interface process, the QS Presentation Manager (QPM). QPM can present patient data in different formats. The Fetal Monitoring Surveillance (FMS) displays fetal wave data and allows users to annotate that data. The Chart interface presents patient data in a tabular chart. The Forms interface presents data in a graphical format. The QS Chalkboard (QCB) interface is an electronic version of chalkboards often found in hospitals at unit central stations, displaying site defined patient data for each unit bed. The Chalkboard Data Services Server (CDSS) manages data that can be accessed via the chalkboard. The Medication Administration Record (MAR) provides the ability to order and chart medications, intake and output fluids.Patient data can also be received from external systems by the system interface process for the Hospital Information System (HIS Inbound) and Patient Monitoring System (PMS).

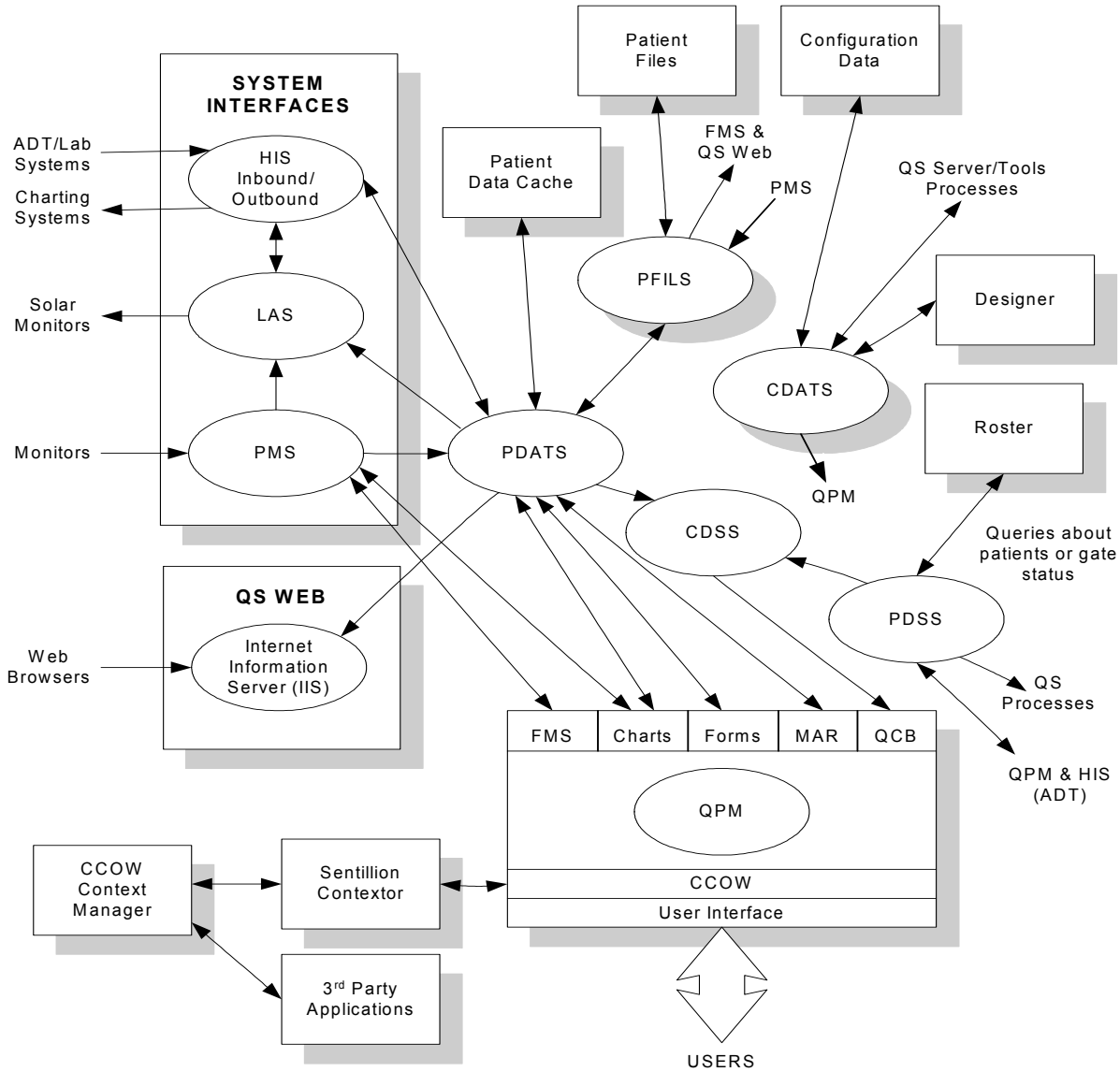

Figure 2: Major Patient Data Interactions within the QS

Patient data can be sent to external systems via:

1. The QS Web server (OB Link\QSWeb) - allows fetal monitor data and other charted patient data to be sent via remote access, intranet or internet for display in a secure web browser on QS or non-QS workstations. The browser interface is read-only.
2. The Lab Access Server (LAS) - makes lab data available to Solar 8000 monitors.
3. The HIS Outbound Interface - sends configurable messages containing patient data either automatically or by user request using the HL7 standard.

Once data has been received by one of the interfaces, it is sent to a Patient File (PFIL) server for storage in the file being managed for that patient. Most data is also cached in memory for quick access by a Patient Data (PDAT) server.

The PDSS process keeps track of and manages the storage of patient data in memory and on the server's disk drive.

CDATS provides configuration data to all QS processes

Figure 3 depicts the ancillary QS processes which are vital to the operation of the QS, but which are not primarily responsible for the receipt and management of patient data. The centralized logging server (LOGS) writes system status and error messages to log files to assist in the maintenance of the QS system. The Scheduled Print Program (SPP) supports the printing of patient and configuration data via a scheduled batch job.

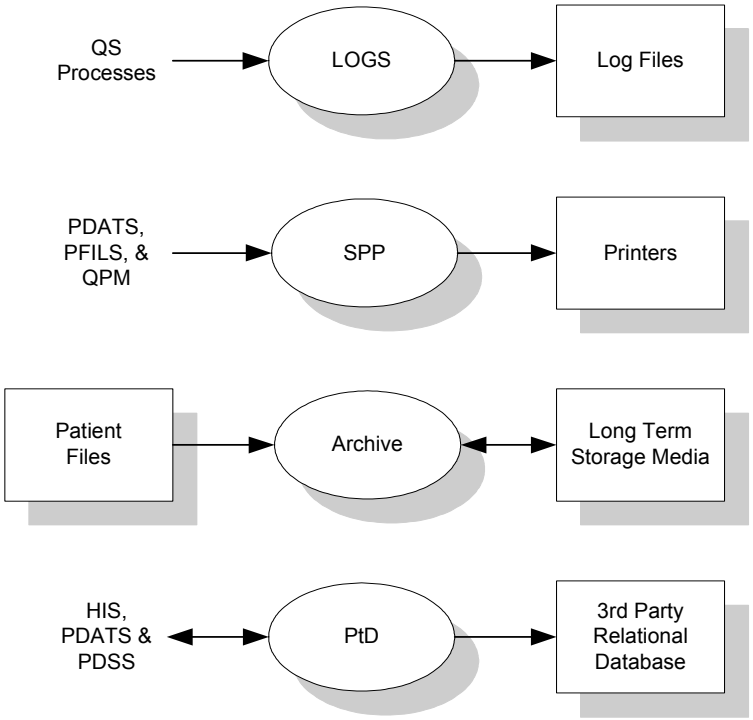

Figure 3: Ancillary QS Processes

The Archive server stores data from patient files to long term storage media. The Patient Data Daemon (PtD) supports on demand or scheduled requests to automatically record data, transfer patients, export patient data, backup patient files, and purge patients from the QS.

A more detailed description of the various QS processes follows in the next chapter.

SPP (Scheduled Print Program) supports scheduled print jobs. The schedules are entered via the QPM user interface, and are stored in the configuration data. SPP can be configured for up to 128 print jobs for different days of the week and starting times. Print requests are made via the QPM user interface utilizing standard windows print queues.

PtD (Patient Data Daemon) supports on demand or scheduled requests to automatically record data, transfer patients, export patient data, backup patient files, and purge patients from the QS. PtD jobs are scheduled using the QPM user interface.

USER INTERFACE FACILITIES

QPM (QMI Presentation Manager) provides the major user interface for the QS. QPM interfaces with PDATS & PMS to support the reviewing or recording of patient data. QPM interfaces to PDSS to support ADT services. QPM may be run on any QS workstation, but is not usually run on the same machine as the critical QS servers in order to improve performance. QPM can present data in five formats. These formats are described in the following paragraphs.

The Chart interface presents patient data in a flowsheet format which mirrors the traditional paper model in content and layout. The characteristics of QS charts are defined in the configuration data, and can be created and modified by the QS user.

The Forms interface is an alternative to the chart interface, providing a more graphical presentation of patient data. QS customers can create and modify forms using the Forms Designer.

The Fetal Monitoring Surveillance (FMS) format displays fetal monitor strip chart data and allows users to annotate the acquired data.

QCB (QS ChalkBoard) provides a bed-centric view of patients in the QS, unlike the Charts and Forms formats which provide a patient-centric view. QCB displays data for multiple patients simultaneously, updating dynamically as data changes without requiring the user to take any action to request a refresh. In normal operations QCB relies on CDSS to provide the information to be displayed on the chalkboard. If CDSS is not operational, QCB can receive the information it needs directly from PDATS and PDSS. For besides displaying patient data, QCB also supports modification of patient data and limited ADT services. QS customers can create their own chalkboard templates using the QCB Designer.

MAR (Medication Administration Record) provides the ability to order, record and view medication, infusion, intake and output fluid, and intervention orders for a patient. There is a mechanism to pre-configure the orders using the Designer. QPM allows the clinician to view, modify and activate orders for a patient. The chart interface for displaying medications (MAR) and fluids (I&O) allows for in-cell editing. MAR has an additional display (Order Summary) which displays all orders for a given patient.

The Windows version of QPM provides a dialog which allows the user to retrieve archived patient data. Search criteria can be used to locate a patient for restoration into the QS. The search criteria include patient id, patient name, CD volume name, date archived, and three optional user defined items. Data can be restored from CD placed in the CD-ROM drive of the workstation running QPM, or from the staging area on the server if the patient file has not yet been written to CD. The patient will be restored into a hold bed of the configured restore unit unless the user chooses some other unit prior to initiating the restore. If a patient id is currently being served in the QS, the user can specify an alternate patient id for the patient to be restored.

QS PROCESSES

Operation of the QS is enhanced/augmented through the use of 'mini-programs' that perform specific activities. Each of these processes is identified and described by the following paragraphs.

Archive

Archive stores data from patient files to long term storage media, currently CD-R. Data can be archived periodically or on demand. Archive maintains a database with information about every successful patient archive, which is used to support the subsequent retrieval of data from the long-term storage media.

The Archive database contains the following of information:

- Patient ID
- Patient Name
- Uncompressed Patient File Name
- Compressed Patient File Name
- Compressed Patient File Size
- Volume Name of the Compact Disk
- Checksum for the Patient File
- Last Value of up to Three User-Configurable Items

Archived patient files can be restored from CD-R on any QS workstation with a CD drive. The restore interface is available in the QPM program.

Before archiving the patient data, the patient files are compressed. The compressed file is written to two CD-R discs. Both discs get the same volume name.

Data files: The Archive and Restore functions use an Access 2000 database to store information about patients that have been archived. The path to this database is **D:\qs\archive\NTArchive**. Please note that in NT configurations, the drive specification remains **E:**.

Log files: The log files for Archive can be found in **\qs\logs\archive**. These files consist of two types of detail files - **ArchAdmi.xx** and **Archive.xx**. **ArchAdmi.xx** details the administrative activities affecting the process (e.g. starting, stopping, parameter changes) while **Archive.xx** details the activities and/or errors relating to the Archive process.

BRelay

The BRelay (Broadcast Relay) process is used to allow broadcasts to span the network. The QS system uses broadcasts and multicasts to relay information to the clients. It is common practice for routers and switches to filter out broadcasts. If a client is on a segment separated from the server via a router that filters out broadcasts, it will not work without the aid of Brelay. You should have one BRelay per segment, per IP sub-network.

Data files: none

Log files: The logs for BRelay can be found in **\qs\logs\brelay**. These files consist of a BRelay log which details process information.

CDATS

The CDATS (Configuration Data Server) program runs only once in a QS environment. This program is responsible for managing and distributing the configuration information to and from other QS processes such as PDSS, PFILS, CDSS, LOGS, etc.

CDATS contains the data dictionary that describes the patient data.

This configuration information is used to tailor the QS to the needs of a hospital site. Almost every QS process reads configuration data at startup, therefore CDATS is a critical part of the QS.

Configuration data is modified via the Designer program.

During system upgrades, the standalone CDUpdate utility is used to modify the configuration data to conform to the format used by the new QS version. CDATS runs a *verification* once a day.

Data files: The configuration files (site tables) are found in the **\qs\site** directory on the machine running the CDATS process.

Log files: The CDATS log files are found in **\qs\logs\cdats**. These files consist of the following:

- **CDATS.xx** files (where xx is a number from 00 to 09) that detail the process function or errors
- **CDATAdmi.xx** files that detail the administrative activities
- **CDATUpda.xx** files which detail modifications to the configuration
- **CDATVeri.x** files which contain information about the verification process

CDSS

The CDSS (Chalkboard Data Services Server) program can only be running on one workstation or server in a QS environment. This program is responsible for maintaining information about patient data items to appear on the electronic chalkboard and 'posting' those items to the chalkboard. This program usually runs on the primary QS server along with PDSS and LOGS.

CDSS keeps a cache of data for every patient in a non-hold bed, plus every patient in a hold bed selected in QPM. It only caches data items that have been specified on the **{{DS_PATIENTDATA}}** chart. As data is charted, CDSS updates its cache and sends that chalkboard data onto the chalkboards. When the relationship between a patient and a bed changes CDSS receives that information from PDSS and passes it onto the chalkboards. CDSS also has the capability of providing data to the chalkboard when the chalkboard asks for it, and for correcting the CDSS cache and its clients chalkboards during a verify. There is only one CDSS in a given QS system. If the CDSS process isn't functioning, PDATS and PDSS send information directly to the chalkboard. As data is updated it will always be displayed on the chalkboard, but if CDSS is unavailable, any initial data values will be displayed as **???** on the chalkboard until CDSS becomes available and executes its verify pass.

This process (like PDSS) runs a verification process every four hours. The times for this verification vary from site to site because the base-hour varies. You can locate the base-hour and the next scheduled verify by performing a process show.

Data files: The CDSS data files are found in **\qs\data**. These files consist of two 'recovery' files (**cdsrcvr.v0** - primary and **cdsrcvr.b0** - backup) used to regenerate the roster when the system or the process is restarted.

Log files: The log files are found in **\qs\logs\cdss**. These files consist of a CDSS - the detail process logs, VERIFY - the CDSS verify detail logs, and ADMIN - the admin thread log for this process.

HIS

HIS (Hospital Information System) controls the interchange of data between the QS and Hospital Information Systems. Acquisition of data from external sources is handled by the HIS Inbound Interface. Distribution of patient data to external sinks is handled by the HIS Outbound Interface.

The HIS Inbound Interface receives messages from external computer systems which contain ADT (admit, discharge, transfer) information, or lab results. The inbound interface will accept messages formatted using the HL7 Standard (versions 2.1 and 2.2) as well as custom, non-HL7 message protocols. The messages are parsed and stored in the patient data record. The interface to the external system may be RS-232 or TCPIP.

The HIS Outbound Interface generates messages containing patient data and forwards them to external systems via a network connection using the TCP/IP protocol suite. Message content is configurable using message template charts. Generation of outbound messages can be triggered automatically when a patient is transferred to a 'Hold' bed in a unit that has been specified in a configurable list or manually at the users request. Outbound messages are formatted using either version 2.1 or 2.2 of the HL7 standard.

In general, each type of HIS interface, inbound or outbound, must be run as a separate HIS process on a separate workstation. If no HIS interfaces are established, then HIS is not executed.

Data files: none

Log files: This program's log files can be found in **\qs\logs\his_xxx** (where **xxx** is the extension for the type of system interface, usually HL7). These files consist of the following detail:

- **HIS_xxx log** which details the HIS process
- **<acquire> log** which details specifics about the acquire
- **<acquire> data log** which details data tracing for the specific acquire

<acquire> represents the name specified in the Manage Configuration - System - Acquire definition (i.e. if the acquire name is ADT, the logs will be called **ADT.00 - ADT.10**).

LAS

LAS (Lab Access Server) provides lab data to Solar monitors on the Unity network. Only one LAS process is run per Unity LAN.

LAS keeps a list of registered monitors, their associated TCP/IP address and port, along with what patient was associated with the monitor the last time the monitor registered with LAS. LAS receives requests from Solar monitors for registration, ADT Data, Lab Directory, Lab Data, and Microbiology/ Blood Bank data. It also receives notifications from HIS about new lab data for a specified patient.

Data files: none

Log files: The logs for LAS can be found in **\qs\logs\las**. They consist of a LAS log which details process information and a log for the defined acquire. The log file will consist of an acquire name with an extension of **.00 - .10**.

LOGS

The LOGS program can only be running on one workstation in a QS environment. This program is responsible for logging information from the other processes running. It is usually found on the primary server (QSServer) running with PDSS and CDSS but is not limited to such. If the LOGS process is not alive or reachable, then the message will be written to **qserror.00** on the local hard disk.

CAUTION

Log files should never be opened (with editors such as Notepad, Word, etc.). If it is necessary to inspect the content of any log file, users should copy the file(s) of interest and rename it (them). The duplicated file(s) may then be opened without risk. Failure to comply with this caution could cause the associated processes (and the QS) to malfunction.

NOTE

All log files in a QS environment follow the same name extension convention. Files with the **.00** extension will always be the most recent and **.10** will always indicate the oldest files. The logs are always in a subdirectory of **\qs\logs** on the primary QS drive on the machine that runs the program.

Data files: none

Log files: This program's log files can be found in the **\qs\logs\logs** subdirectory. There may be up to eleven files named **QSLOG.00 - QSLOG.10**.

PDATS

The PDATS (Patient Data Server) program runs multiple times in a QS environment. It is usually found on all client machines; mobiles and print servers are avoided if possible. This program is the patient cache server. When a patient is being accessed, for either reading or writing, the patient data is loaded into a cache (RAM) on a workstation for faster access. Each patient is handled by a PDATS slot, which is essentially a thread that provides service for that patient.

PDATS is the primary way that most QS programs query and store patient data. When PDATS receives data to be stored, it gives that data to PFILS so that the data will be stored in the file. Likewise, when a PDATS slot is being loaded, it requests patient data from PFILS.

PDATS also handles computed items and is responsible for item classes as they relate to results reporting. There may be many PDATS processes running in a QS system, although only one PDATS process should be on any given workstation. If a PDATS dies or is unavailable, PDSS will cause a different PDATS workstation to provide service for the patient(s) to be cached.

Data files: none

Log files: This program's log files can be found in **\qs\logs\pdats**. These files consist of only a PDATS log. This log contains all cache-slot 'load' and 'unload' transactions.

PDSS

The PDSS (Patient Data Services Server) program can only be running on one workstation in a QS environment. This program is responsible for maintaining information about resource availability on the various workstations and patient data resources. As an example, this program keeps track of the number of PDATS slots available, in use, and who is loaded in these slots, as well as the patient file storage location.

PDSS accepts inputs from HIS and QPM to admit patients to the QS, transfer them to different units and rooms, and other high-level management functions. PDSS provides demographic information to QS processes requesting directory information. PDSS also manages the gate status, which inhibits most QS processes from starting until the essential QS processes are ready to provide service.

This program usually runs on the primary QS server along with CDSS and LOGS. This program runs a verification process every few hours. The times for this verification vary from site to site because the basehour varies. You can locate the basehour and the next scheduled verify by performing a process show.

If PDSS is not active, then system services are degraded. Users cannot log in and new QS processes cannot start up. However, processes that already know which PDATS/PFILS are providing service for their patients can continue to function.

Data files: This program's data files are found in **\qs\data** for versions 4.05 and above. They consist of two recovery files (**pdsrcvr.v4** - primary and **pdsrcvr.b4** - backup), used to regenerate the roster when the system or the process is restarted.

Log files: The log files are found in **\qs\logs\pdss**. These files consist of a PDSS - the detail process logs, **VERIFY** - the pdss verify detail logs and **ADMIN** - the admin thread log for this process.

PFILS

The PFILS (Patient File Server) program can be running multiple times in a QS environment. This program is responsible for the management of the files in which the patient files are stored. PFILS performs all read and write transactions to these files, as well as file manipulation (renaming, purging, etc.).

Data for each patient is stored in a separate file. There must always be a primary copy of this file, which has the extension of **.v01**. If the system is configured for redundant PFILS, then a secondary copy of the patient file will be maintained with the extension of **.s01**. PFILS has a verify capability which checks the validity of patient files. There must be at least one PFILS in a QS system. There may be more than one PFILS, but if so, a given patient will be served by only one of those servers. If PFILS is unavailable, then patient data cannot be saved.

Data files: This program's data files are found in **\qs\pfils** on the machine running the PFILS process. The drive may vary but is usually **D:** (**E:** on NT systems). The data files are the actual patient data files and have the naming convention of **<patient-id>.v01** for primary files and **<patient-id>.s01** for secondary files.

Log files: This program's log files are found in **\qs\logs\pfils**. These files consist of only a PFILS log. This log contains all information about patient file manipulation and verification.

PMS

The PMS (Patient Monitoring Subsystem) program may be run multiple times in a QS environment. This program is responsible for acquiring monitor data (adult or fetal), and storing it in the patient's file and/or transmitting it for display on the workstations. PMS can auto-detect per-port-fetal-monitors from Corometrics (115, 116, 118, 120 series, 145, 150, 151, 155, 170 series and 556), Hewlett Packard* (135x, 8040A and 8041A), Oxford** (Sonicaid Team and Team Duo), AMS** (FetaScan 1400 and 1500) and Kranzbühler** (FetaCare).

PMS maintains a 30-minute cache of parameter data, a 50-minute cache of fetal data, and broadcasts fetal monitor data to all requesting clients. PMS receives annotations from FMS and provides data for monitor charts to QPM. If notification is enabled, PMS will analyze fetal heart rate (FHR) data, notify QPM/FMS of Hi, Lo, and Penlift states, and receive notification acknowledgment from FMS. PMS also supports Spectra Alerts. PMS may run on more than one server or workstation. The PMS process starts several threads for each configured acquire while the acquire monitors data that is to be supported by PMS on assigned workstation. If no acquires have been configured for a given PMS on a given workstation, PMS will terminate execution.

* Hewlett Packard's medical division is now called Agilent Technologies.

** Support for Oxford Sonicaid, AMS and Kranzbühler monitors from QS version 5.05.

Data files: The NOTIFICATION_SETTINGS.DAT file is found in **\qs\data** on the workstation running this process. This file contains the Fetal Notification settings for each bed in a QS environment. It does not apply in an ICU environment.

Log files: PMS log files can be found in **\qs\logs\pms**. These files consist of the following:

- **PMS log** which details the PMS process
- **<acquire> log** which details specifics about the acquire task
- **<acquire>-data log** which details data tracing for this specific acquire task
- **<acquire>-trace log** which contains the tracing files for the acquire task.

The **<acquire>** represents the name specifies in the Manage Configuration - System - Acquire definition (e.g. if the acquire name is SERIALFM, the logs will be called **SERIALFM.00 - SERIALFM.10**).

PtD

The PtD (Patient Daemon) process is responsible for on demand or scheduled requests to automatically record data, transfer patients, export patient data, backup patient files and purge patients from a QS system. This process can be found running multiple times in a QS environment.

Data files: The data files for PtD can be found in **\qs\logs\pdss**. They consist of several **.dat** files that keep track of which patients, charts and jobs have completed.

Log files: The log files for PtD are found in **\qs\logs\ptd**. These files consist of a PtD log which details the PtD process and a detail log for each PtD job defined on the system. These log files have the same name as the job definition - up to 32 characters and with **.00 - .10** extensions. They detail specifics about the activity of each configured, enabled PtD job.

QPM

QS Program Manager (QPM) is the user interface program and is used to interact with the system. This program runs on all interactive workstations being used for patient data retrieval or review.

Data files: none

Log files: none

SPP

SPP (Scheduled Print Process) runs on any workstation in a QS environment which manages a printer that a site wishes to run scheduled print jobs automatically from the QS. From QS version 5.05.0, SPP supports scheduled batch printing i.e. printing a collection of documents at a specified time or interval.

Data files: The data files consist of three **.dat** files found in **\qs\spp** on the workstation running the SPP process. These files keep track of which patients, charts and jobs have completed and aid in the recovery process should SPP fail.

Log files: The log files for SPP are found in **\qs\logs\spp**. These files consist only of the SPP log which details information about the SPP schedule.

SYSTEM FUNCTIONS

This section of the manual consists of additional information about several parts/functions of the QS system. This information is intended to provide a better understanding of the QS. Information is grouped by function, rather than by QS process.

Log files

All processes in the QS system maintain their own log on the local harddrive. The log messages are written to a log file in **\qs\logs\<process name>**. A set of up to 11 log files are maintained, with extensions **00 - 10**. The file with extension .00 is the newest.

When the line count of the current log file exceeds it's maximum (2000 lines by default), the log file with extension **.10** is deleted, the existing logs renumbered with the next higher number, and a new log file with the extension **.00** is started. This so called *cycling* of the log file can also be requested with an admin command.

Messages have the following format:

10/11 10:08:08 QSClient1:QPM > My log message

date time workstation:process>log message

If the LOGS process is not available, a process will attempt to write locally to **\qs\logs\qserror.00**.

When a new process is started, it will cause the contents of **qserror.00** to be added into **qslog.00** if LOGS is running and **qserror.00** is not too big.

If a process can not log to its current log file (**.00**), a log file with the extension **.99** will be created. The existence of this log file will block further logging by the process. Therefore, log files with the extension **.99** should be deleted. While the **.99** file exists, the process will log to **QSError.00**.

The LOGS process additionally maintains the central log file (**qslog.xx**) and the user action log (**ua.xx**).

The central log file contains *important* messages from various QS processes.

The user action log logs user activity on the system like selecting a patient, displaying a form, etc.

Abnormal log messages can often be recognized by:

- exclamation marks in the message
- the words: unexpected, error, time-out
- the same message repeated over and over in the logs

When a process is terminated abnormally, it writes error information to **errorinf.$$$**. Errorinf files with less than 1024 characters will be written to the central log file, otherwise a message is logged that the error information was too large to log.

Storage Configuration

In every QS system, patient data is stored in duplicate on the server's hard-drives. Optionally, one copy of the data may be written to a second server (backup server) instead of the primary server's second disk(set).

Single Server Systems - Windows NT

A common disk configuration for the primary QS server in a Windows NT configuration is shown in Figure 4.

The first partition set consists of 3 partitions implemented on a RAID 5 array of 3 identical physical disks.

With the RAID 5 array, 3 disks with n GB storage capacity yield a total usable disk space of 2n GB. This RAID array is implemented at the hardware level, not the Windows NT level, by using an array controller.

Disk 1 holds the system partition **C:** with the Windows NT system files, the QS partition **D:** which holds the QS software and the PFILS partition **E:** that holds the QS patient files and the MS Access database files.

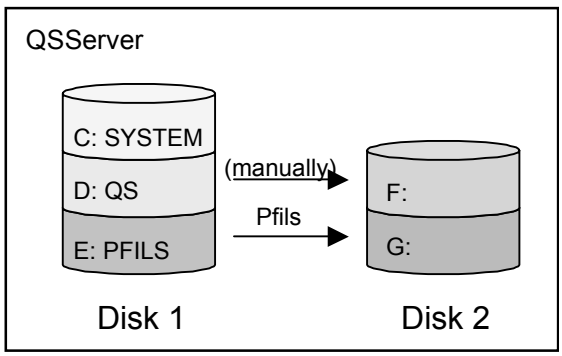

Figure 4: Single Server Disk Configuration - Windows NT

The second part of the storage space consists of a single disk with at least 2n GB storage capacity. This disk holds copies of the QS and the PFILS partitions in the RAID5 array as partitions **F:** and **G:**, respectively. The QS program files and configuration data is copied to the **F:** partition during manufacturing of the system.

Maintaining the copy of the patient files is the responsibility of the PFILS process. As soon as an item of data is entered and the user moves to the next input field on a form or chart, PFILS writes the data to both copies of the patient file.

The Windows NT drive letter assignments are summarized in Table 1.:

Table 1: Drive Letter Assignments - Windows NT

Drive Letter	Purpose	File System
A	Floppy disk	FAT
C	Boot and System partition	NTFS
D	QS partition	NTFS
E	Patient files (PFILS) partition	NTFS
F	QS Backup partition	NTFS
G	Patient files backup partition (PFIL-BACK)	NTFS
H	CD-drive	CDFS

Single Server Systems - Windows 2000

A common disk configuration for the primary QS server in a Windows 2000 configuration is shown in Figure 5.

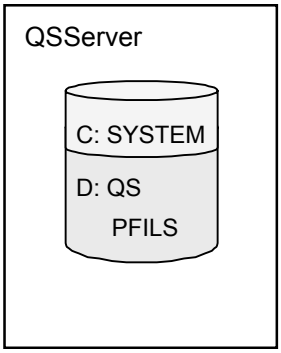

Figure 5: Single Server Disk Configuration - Windows 2000

The first partition set consists of 2 partitions implemented on a RAID 5 array of 2 identical physical disks.

With the RAID 5 array, 2 disks with n GB storage capacity yield a total usable disk space of 2n GB. This RAID array is implemented at the hardware level, not the Windows level, by using an array controller.

The single disk 1 holds the system partition **C:** with the Windows 2000 system files. The QS partition **D:** holds the QS software and PFILS (that holds the QS patient files and the MS Access database files).

The Windows NT drive letter assignments are summarized in Table 2.:

Table 2: Drive Letter Assignments - Windows 2000

Drive Letter	Purpose	File System
A	Floppy disk	FAT
C	Boot and System partition	NTFS
D	QS partition Patient files (PFILS) partition	NTFS
E	CD-drive	NTFS

Dual Server Systems (Windows NT Only)

In systems with a backup server, Disk 1 of the backup server acts as the receiver for the data from the primary server's **D:** and **E:** partitions. The configuration for this type of system is depicted in Figure 6. For both servers, the two **C:** partitions are identical.

The data on the QS partition (**D:**) is periodically copied by the QSCopy program. The frequency of the copy is configurable and is by default once every 60 minutes.

As in the single-server system, maintaining the copy of the patient files is the responsibility of the PFILS process. As soon as an item of data is entered and the user moves to the next input field on a form or chart, PFILS writes the data to both copies of the patient file.

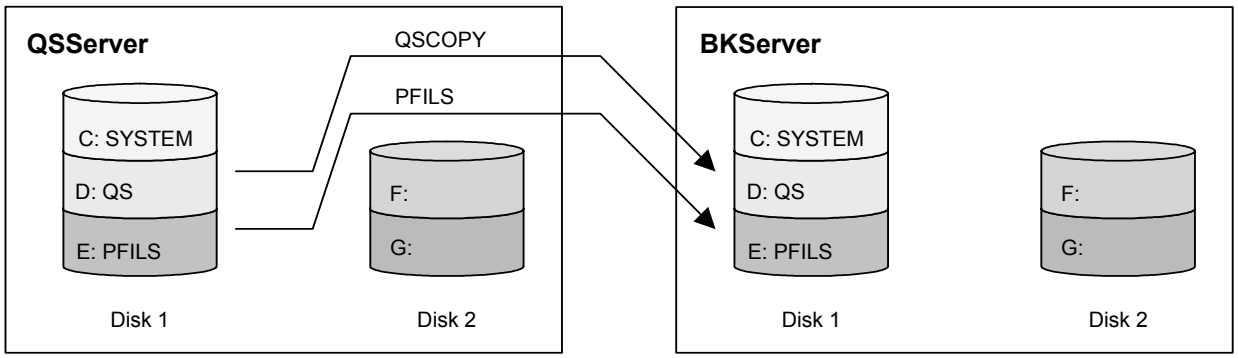

Figure 6: Dual Server - Disk Configuration

File Naming Convention

The application files are stored in compressed format and are named in the following format:

- **RxxxxLnn.exe** for release files, where **xxxx** is the version and **nn** is the build number of the release
- **RxxxxPmm.exe** for patch files, where **mm** is the patch number
- **SxxxxLnn.zip** for string files, where **xxxx is** the version and nn is the build number of the release
- **HxxxxLnn-ddd.zip** for help files, where **xxxx** is the version and nn is the build number of the release and ddd is the type of database (e.g. QKS, CIS)
- **WxxxxLnn.exe** for OBLink files, where **xxxx** is the version and nn is the build number of the release
- **UxxxxLnn.zip** for OBLink help files, where **xxxx** is the version and nn is the build number of the release

Strings and help file zip files have the format **SxxxxLnn** and **HxxxxLnn**. If strings and/or help files are changed with a patch, the names change to **SxxxxPmm** and **HxxxxPmm**, respectively.

The OB Link executable release file has the form **WxxxxLnn**, the patch would be **WxxxxPmm**.

The OB Link help zip file has the form: **UxxxxLnn**, whereas a patched version would be **UxxxxPmm**. Examples of the file names associated with various QS Components are summarized in Table 3.

Table 3: QS Component File Name Examples

QS Component	File Name
Release	R5050L38.EXE
NT patch	R5050P03.EXE
Strings	S5050L38.zip
Strings patch	S5050P03.zip
Help	H5050L38.zip
Help patch	H5050P03.zip
OB Link release	W5050L38.exe
OB Link help	U5050L38.zip

QS Directory Structure

The QS directory is the place where most of the QS-relevant files are stored. Every server and workstation in a QS system has a QS directory. Workstations have a subset of the QS directories shown here.

D:\QS\Archive

Holds the patient files that are waiting to be archived. They are copied here by the PtD process.

D:\QS\Archive\Image

The working directory when archive CDs are being created.

D:\QS\Data

This directory holds the strings files. Together with the site tables, these determine the language in which the QS is presented to the user.

D:\QS\Exe

Here you will find all the QS executables, DLLs and utilities, such as Cdatdisp. For a primary QS server, the contents of this directory is copied from the Update directory, every time the server starts.

D:\QS\HL7Out

This directory contains the recovery files and end of job reports related to HL7 Outbound processing.

D:\QS\Logs

Logs holds all the log files for the processes running on the local machine. On the QSServer, logs also keeps the main QS log file (**QSLog**) and the user activity log file (**UALog**).

D:\QS\MSAccess

The directory where the Microsoft Access database files are stored.

D:\QS\Pfils

The directory where the patient files are stored.

D:\QS\Release\NT

This directory contains the application and configuration files for the servers (**QSServer.bat**) and the clients (**QSClient.bat**). The clients copy strings, help, release and patch files from here on startup.

D:\QS\Site

The site tables are stored in this directory. Together, the site tables form the configuration database. Although the database consists of a number of separate files, it is not possible to replace files one-by-one. The files form a relational database and if single database files are replaced, references in the database may be lost and the database will become unusable.

D:\QS\SPP

This directory contains the recovery files and end of job reports related to SPP.

D:\QS\Tools

In the tools directory, all the startup batch files and utilities are found that have no place in the Exe directory or in one of the subdirectories of Release. It also holds templates for **QSServer.BAT**, **QSClient.BAT** and **QSClient.CMD**.

D:\QS\Web

This directory contains the executables, Active Server Pages and help files for the OB Link web site. This directory is only present on QS servers in a surveillance system with the OB Link option.

Archive and Restore

Long-term storage of patient data in the QS is achieved by writing patient files to CD-ROM. The patient data can later be restored via a user menu selection within the QPM program.

The archiving process

Figure 7 provides an overview of the archiving process:

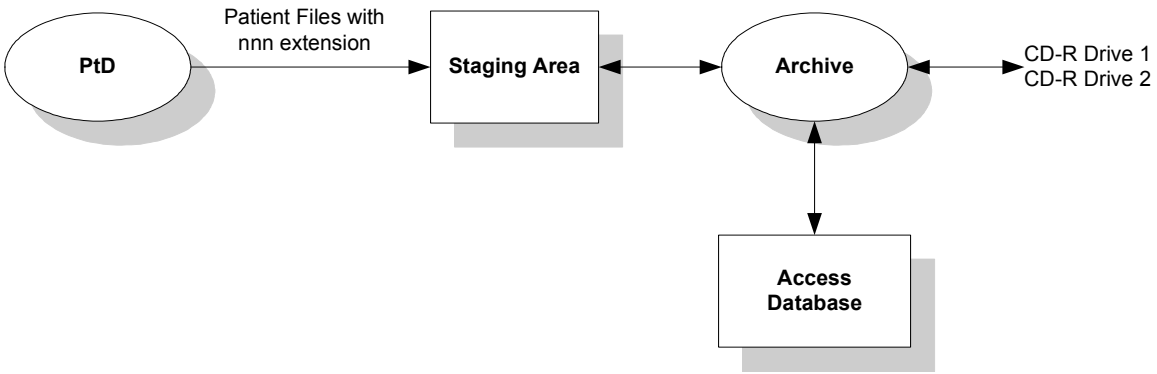

Figure 7: Archive Data Flow

PtD will periodically copy patient data that is ready for archival into an area on a hard drive known as the staging area. The Archive server will wake up once an interval (default of 60 minutes) to determine if there is data ready for processing. If files are found with extensions between **000 - 999**, they are assumed to be patient data files. These files are verified and compressed. If sufficient data has accumulated in the staging area (default 600 MB compressed data) or sufficient time has elapsed since the previous archival to CD (default 90 days), the data will be copied to a pair of CD-R disks.

There will be only one Archive server running at a given QS site. Archive is run on the main server so that it can take advantage of the file protection available on the server's disk.

Since the Archive process often executes on a server far from any consistent user observation, Archive will send popup messages to logged-on QS users for important events. Important errors are sent to all QS users while success or maintenance messages are sent only to system staff. The following popup messages may be generated:

All users:

- Insufficient disk space to perform archive
- Error writing to CD-R Device x
- CD Volume x, written to CD-R Device y failed verification!
- No blank disks found while attempting to write CD.

System staff only:

- CD-R Device x: No disk. Please insert new, blank disk.
- Used data disk. Please insert new, blank disk.
- Damaged disk. Please insert new, blank disk
- CD-R Device x: Unknown disk. Please insert new, blank disk.
- CD successfully written and validated to CD-R Device x, Volume name: y

The archive database

Archive and restore use an Access database to store information about patients that have been archived. This database is located in **\qs\archive\NTArchive.mdb**. The database will grow larger as data is archived.

Never delete, overwrite, rename, or open the database (unless directed by QS Technical Support) or you could corrupt the data that has been archived to disk.

The Access Database is used to maintain a directory of all archived patients, and information about each patient file that would aid in efficiently restoring a patient file regardless of how long ago that patient was archived. This information includes but is not limited to the volume (disk) they were archived to, patient name, patient ID, the date the file was archived, the media to which the patient file was copied and the status of the patient file.

The database file will grow as data is added into it. According to Microsoft, the maximum size of an Access database using the Microsoft Jet engine is 2 gigabytes. If the average patient record in this database is 1KB (it's probably less), you would be able to fit approximately 2,000,000 of these records in the database.

In order to connect to the database, Archive and Restore use a DSN-less connection. This means that you do not have to go into the control panel and set up a data source name (DSN) for the connection to work. The QS will take care of the connection for you. However, a copy of the appropriate ODBC driver (MDAC) must be installed on each computer for the queries to function.

Patient file size considerations

If a patient file is too large to archive because of available memory constraints or the CD-R storage media limitation of 600MB, the **.000** file will remain in the staging area indefinitely and be renamed with a **BIG-nnn** extension. Thus, the file will never be able to be Archived or Restored. If a site wishes to restore the file, they will need to manually copy the file from the staging area to the PFILPATH and rename the file to a .**V01** extension. They then need to issue the command, **QSMAN QSSERVER PDSS SET RESTORE=<PatientID>@QSSERVER** in order to restore the file (**<PatientID>** is the ID number of the patient).

How Archive initializes disks

When Archive encounters a blank disk, it initializes the CD before writing to it. Disk initialization occurs automatically, requiring no action by the user.

Each pair of CDs will be assigned the following volume name: **PPDDDYYYYNN**

PP is the configurable prefix that can be set in the Designer. QS is the default

DDD is day of the year (January 1st is 001 and December 31st is 365 in most years)

YYYY is the year (2002)

NN is a count that goes up if more than one batch of CDs is created in a day. This starts at 01.

What happens when one of the CD-R drives is not operational

Archive is able to work with just one CD-R(W) drive. Archive always makes two CDs for a given batch of data. Should one drive fail, the first data copy (image) will be written to the first available functioning drive. Once the CDR disk is replaced, Archive will write the second copy of data to the same drive.

CD-R life expectancy

CD/CD-R life varies according to type and manufacturing method. Manufacturers claim 75 years (cyanine dye, used in *green* discs), 100 years (phthalocyanine dye, used in *gold* discs), or even 200 years (*advanced* phthalocyanine dye, used in *platinum* discs) once the disc has been written. The shelf life of an unrecorded disc has been estimated at between five and ten years.

Exposing the disc to excessive heat, humidity, or to direct sunlight will greatly reduce the lifetime. In general, CD-R media is far less tolerant of environmental conditions than pressed CDs, and should be treated with greater care. A scratch in the top surface (label side) will render a CD-R unusable. CDs should be stored in a cool, dark, dry place.

CD-RW (CD Re-Writable) disks are an entirely different media and in no way compatible with CD-R media or devices. CD-RW disks have an entirely different composition.

Other important things to know about Archive

1. Each compressed patient file must be smaller than 600 MB as the available space on a CD is limited to 600 MB and the first release does not have the ability to straddle one patient file across multiple disks. If files are encountered that are too big, the file will be renamed with a **BIG-nnn** extension.
2. The time and days that PtD backup jobs occur should be carefully considered. It would be best to have the patient files *ready to be compressed* when other processes are NOT running verifies and when very few users are on the system. Then, theoretically, when Archive initializes (every hour), it will go through its compression process and have less impact on the system performance.
3. A CD-R can not be burned if less than 1.5 MB of compressed patient data exist
4. Archive will always attempt to write as much data as is in the staging area to CD-R regardless of the current MB_DATA setting, up to 600MB. For instance, if the MB_DATA setting is 200, when 200MB of compressed data has accumulated in the staging area, archive will attempt to copy this data to CD-R. However, if there are no blanks in the drives, archive will not be able to write, but will continue to accumulate and compress data. If, when there are finally blanks available, 500MB of data has accumulated

in the staging area, archive will write all that data to a pair of duplicate CD-R's, not just 200MB. If 700MB of data has accumulated, the oldest 600 MB will be archived and the remaining (most recent 100MB) will be left in the staging area until archive is triggered again, either manually by **SET ARCHIVE**, by **TIME_SPAN** or **MB_DATA**.

5. On termination, Archive closes all files and de-allocates memory. Archive can not be terminated while it is in the middle of writing to CD-R, because the Nero interface software will hang. Therefore, if a termination admin command (stop, cycle, cycle with reboot) is received, Archive will delay termination until the current archival process is complete. When an Archive **STOP**/**CYCLE** is issued and Archival has already begun, it can take up to 4 hours to stop Archive.

Files used by Archive

In the staging area:

ptid.nnn - the patient file copied in by PtD

ptidmmddyyyysssssssss.tmp - the working file during preprocessing

ptidmmddyyyysssssssss.gz - the compressed file ready to be written to CD

ptid.BAD-nnn - patient files that failed verification

ptid.BIG-nnn - patient files that are greater than 600 MB when compressed, and thus too big to fit on the media

NTArchive.mdb - the Access database file

error.out - a temporary file that only exists during interval processing. Contains any redirected errors from the Stingray compression software

In the image directory:

Used by Windows 2000 Configurations Only (Nero)

QSDDDYYYYNN.REC - lists all patients that will be stored in the archive

QSDDDYYYYNN.NRG - the image file as the archive is being created

QSDDDYYYYNN.1 - the image file as it is being copied to the 1st CD

QSDDDYYYYNN.2 - the image file as it is being copied to the 2nd CD

QSDDDYYYYNN.DONE - the recovery file after both disks have been created

NOTE

Windows 2000 versions of Archive will also archive any existing **CDATS.zip** (backup) files to the CDS.

Used by Both Configurations

VOLPARAM.INI - parameters used by CD writing software

QSDDDYYYYNN.TXT - comma-delimited ASCII DB entries for the patients in a given volume

Used by Windows NT Configurations Only (SmartStorage)

QSDDDYYYYNN.CDI - the image that will be written to CD for the volume name to the left of the dot

QSDDDYYYYNN.LAY - specification for files to be included in the image and their ultimate destination on the CD

PRETXT, PRECDI, PRELAY - initial versions of the files listed above

QSDDDYYYYNN.LVT - transient file created and destroyed by Smart Storage in the creation on the **.PRECDI/.CDI** image file

QSDDDYYYYNN.DAT - transient file created and destroyed by Smart Storage in the creation on the **.PRECDI/.CDI** image file

Archive Admin Commands

For a list of administrative commands that can be issued to control Archive, see "Archive Arguments" on page 45

Example output from qsman qsserver archive show

Sending SHOW to ARCHIVE on QSSERVER

Archive GA R5042L16 1999 running at QSSERVER Terse

Up since: 10/11/1999 18:01:13 Current time: 10/11/1999 21:09:52

Staging Area \\QSSERVER\Archive\: Data ready for archival: 256 MB/42 files MB free: 701

Target Drive 1: Data or other used disk. Please replace with blank disk. Drive Status Date: 10/11/99 21:04:05

Target Drive 2: Data or other used disk. Please replace with blank disk. Drive Status Date: 10/11/99 21:04:05

Current Settings: 60 Minute Interval; 1X Write Speed

90 Day Time Span; 600 MB Data Threshold

Next archival to disk starts in 75 days or 344 MB

Archive status: Last Archive: An unspecified error was returned by the last attempted archive.

Last archive error: Could not inventory CD-R Device 2: Drive may be empty.

Last completed volume: BZ270199902 126 MB/100 files on 09/27/1999

Admin: 2 @ 10/11/1999 21:09:52; Processing SHOW

Archive: 4 @ 10/11/1999 21:03:33; Waiting for next interval in 60 minutes

QPM Restore

The Restore Patient QS Action will launch an appropriate dialog if the corresponding licence has been purchased. This dialog will not be displayed unless you have the Archive license and the currently logged on user has the Restore user privilege.

The search criteria in the upper left-hand corner of the dialog are used to search for patients that match all of the specified criteria. Patient Id, Patient Name, CD-ROM and Date Archived are always displayed. There are 3 user configurable items (in this case **Delivery Date**, **PT-AGE**, and **Gravida**) that are only displayed if they are configured.

After the user has specified all of the search criteria that they are interested in, they press the Search button. This will populate the bottom half of the screen with the patients that meet the selection criteria. Below the list of patients, one can see the number of patients that matched the search criteria. The columns can be sorted by clicking on the title name for the column. The columns contain:

- **Patient Id** - the Patient id of the file that was archived
- **Patient Name** - the latest charted value for patient name. If no patient name was charted, this will say **No Name**
- **User Configurable Items** - The values that were charted for user configurable items 1, 2, and 3. The title shown is the name of the item that is currently configured for that user configurable item.
- **CD-ROM** - The volume name of the CD where the data has been written. If blank, the data is in the staging area.
- **Date Archived** - when the data was written to CD
- **File name** - the filename of the patient file on the disk. This is the compressed file name.
- **File Size** - the size of the patient file

To restore a patient, either double-click the entry or highlight and press the Restore button. The following things may happen once you initiate a restore:

- If it cannot communicate with the Archive server and the data is in the staging directory but not yet on CD, Archive will give you an error message that it can't find the staging area.
- If the data is on a CD and Archive cannot find that CD in the drive of the machine running Restore, it will prompt you to put that CD into the drive.

The patient data file will be copied to the **\qs\restore** directory on the client workstation where the file will be uncompressed and verified. The patient file will then be copied to PFILS and a restore command will be issued to PDSS.

If the patient id is already active in the QS, you will be prompted to specify a different patient id. This has the same effect of doing a change id on the file that you are restoring into the QS. The patient already in the QS is unaffected by this.

The patient file will go into the unit specified in the upper right hand corner of the Restore dialog screen.

The restored patient will become the selected patient in the QPM that is running the restore dialog.

Problems restoring due to CD drive dirty / CD-R media problems

Scratches on the CD-R media or dirt on either the CD-R media or the lens in the CD drive can cause problems when trying to restore files. Several steps can be taken to remedy this situation.

First, make sure the CD-R media is clean. Any foreign matter large enough to see on the bottom side of the CD-R must be removed. CD-R manufacturers recommend cleaning the CD-R with a soft, dry cloth. Do not use any solvents.

If the CD-R has light surface scratches on the bottom side, in some cases they may be polished out. There are commercially available polishes designed for use on CDs. Follow the instructions included with the product. These will only repair the lightest scratches.

If the CD-R itself is not he problem, it is possible that the laser lens in the CD drive has accumulated dust or dirt.

Printing

Batch printing

As indicated by Figure 8, the QS supports batch printing, which allows printing of multiple objects (such as charts and forms) with one request. This capability is useful for daily shift prints, discharge prints, transfer prints, and physician rounds prints. Under the Clinical Print tab of the Designer there is a choice called **Batch Print**. These are defined by the System Manager and added to the appropriate user views. Each element in the batch has a range of time of data to be printed (i.e. 8 hrs, 12 hrs, 24 hrs, all data, etc.). The user invokes the batch through one of the navigators. A batch print dialog will appear and the user must provide an **Anchor Date** and **Time** (end of the range of time), select a print queue and press the **OK** button. The batch will send all print jobs for to the printer associated with the selected queue.

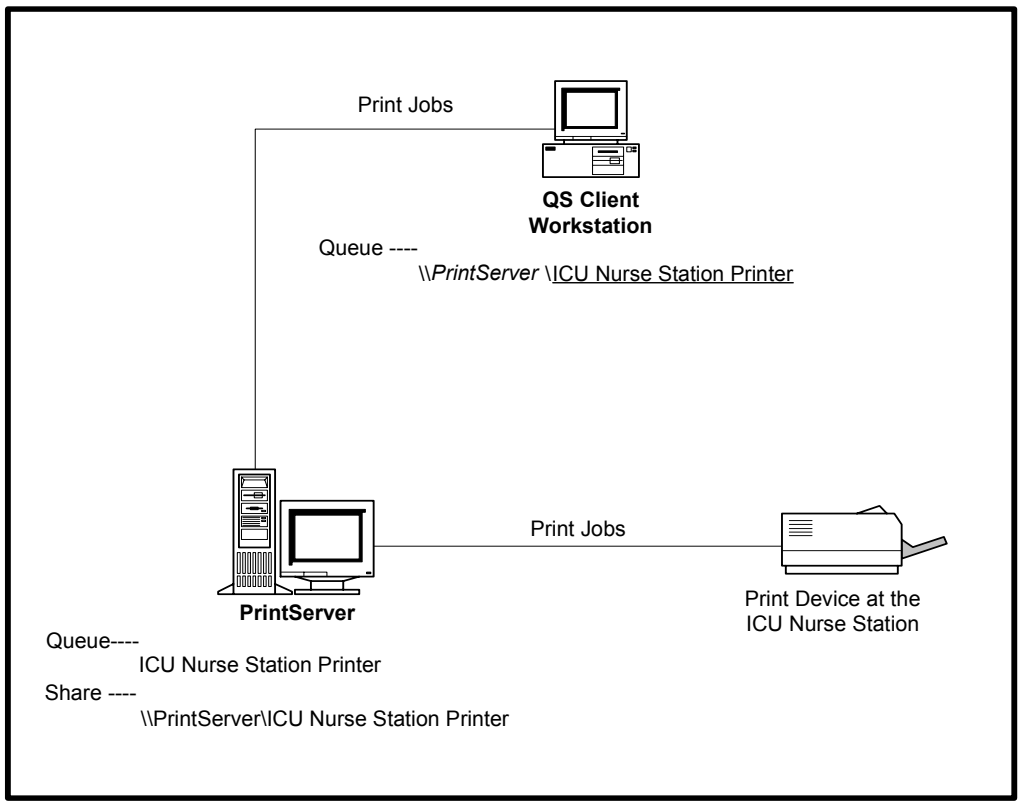

Figure 8: Printer Configuration for Batch and Scheduled Printing

Scheduled printing

As illustrated by Figure 8, printing may be scheduled to automatically print at a predefined day and time. Under the Clinical-Print tab in Designer you will find a **Scheduled Print** selection. The System Manager can create scheduled print jobs to run on specified workstations and print to specified printers. This functionality is useful for physician rounds print jobs, shift print jobs, and daily medical records print jobs.

SPP essentially replaces the user for the purposes of a batch print. Therefore, as part of the scheduled print job definition the System Manager must minimally specify the following:

- Scheduled Run Time.
- Data Range End Time (Anchor Time).
- Whether the data Range End Time is before, the same as, or after the Scheduled Run Time.
- Which Batch jobs to Print.
- The Patient Selection Criteria (i.e. which patient population to print).
- The workstation on which it will be run.
- The printer where the output shall print.
- The print-template used for the end of job report. If this template has a region, it will be filled in with the report from the report-file created by SPP.

The printer selection field on the dialog uses a drop down list to display all the printers in the QS Printer Configuration. It also supports free text entry. The System Manager must select the printer name from the drop down list.

The text files (other than logs) created by the SPP process(es) are located in the **\QS\SPP** directory. The files are:

JobRecovery.dat - This is the job and patient recovery file. It lists the SPP job being run and the list of patients selected.

PtRecovery.dat - This shows the status recovery file. It lists the current patient, the last run batch id and the last run element.

RetryCount.dat - This is the retry count file. It contains the current retry count.

SPPReport.txt - This is the end of job report that is written while SPP is running a job.

OB Link

OB Link (QS Web server interface) is a web-based solution to deliver and display fetal trace data, fetal alerts and other charted patient data to remote client web browsers through the Internet Information Server. For a sample OB Link screen, see Figure 9.

The OB Link web application uses Active Server Page (ASP) technology to embed the patient data in web pages using HTML format. A URL (Uniform Resource Locator) will initiate the transmission of fetal heart rate data from the QS web server (ISAPI DLL) to the Java applet running in the client browser.

The QS must be at version 5.05 or higher to run OB Link.

Figure 9: OB Link Fetal Strip Display

QSWeb

The new **QSWeb.DLL** component is loaded by the IIS (Internet Information Server) program (**InetInfo.Exe**) that resides on the **C:** drive. **QSWeb.DLL** is configured as an ISAPI filter to the IIS program and is loaded during startup of IIS. QSWeb interfaces with the other QS processes to generate the web pages for the OB Link web site.

This feature has been developed to run on the main QS server but can optionally be run on a QS Load Share server–however, QSServer must be running on the workstation functioning as the QS server.

Internet Information Server (IIS from Microsoft)

This is also known as the Microsoft's IIS program. It is a Windows service that can be controlled via **Settings -> Control Panel -> Services** icon.

NOTE

It is important to note that the QS processes (specifically CDATS) need to be brought up first.

The IIS process need to be set up for manual start from the **Settings -> Control Panel -> Services** icon. Additional information about IIS may be obtained at the following URL:

http://www.microsoft.com/windows2000/server/evaluation/features/web.asp

Log files

The new **QSWeb.DLL** component is loaded by the IIS program (Internet Information Server / InetInfo.Exe) that resides on the **C:** drive. When **QSWeb.DLL** attempts to log messages it looks for the proper subdirectories on **C:\QS\LOGS** but the logs subdirectories really reside in **D:\QS\LOGS** in a production environment.

A new optional parameter called **LOGSPATH** will be supported. During the QS initialization process, it will look for the **LOGSPATH** environment variable and use its value as the log file subdirectory. Setting the **LOGSPATH** variable to **LOGSPATH=D:\QS\LOGS** will allow **QSWeb.DLL** to locate the logs subdirectories.

The log files for OB Link can be found in the **\QS\LOGS\QSWeb** subdirectory. The **QSWeb.DLL** loaded by IIS (Internet Information Server) will write to this file.

IIS, which loads the QSWeb DLL, logs to **C:\WinNT\System32\Logfiles\W3SVC1\inYYMMDD.log** where **YYMMDD** is the current date.

Strings Files

The new **QSWeb.DLL** component is loaded by the IIS program (InetInfo.Exe) that resides on the same drive as the QS (normally **D:**). When **QSWeb.DLL** is initialized, it attempts to load the string files from **C:\QS\DATA** but the string files really reside in **D:\QS\DATA** in a production environment.

Use the **DATAPATH=** environment variable so that the **QSWeb.DLL** can find the strings files It needs to be set to **DATAPATH=D:\QS\DATA**.

OB Link web files

A self-extracting archive file **EG6600L14.EXE** contains the OB Link web files.

A new subdirectory **\QS\Web** will contain all the web-related files for the OB Link web application.

The **WXxXxLxx.exe** file is a self-extracting zip file containing files for the **\QS\Web\Data**, **\QS\Web\Class** and **\QS\Web\Images** subdirectories and must therefore be executed from the **\QS\Web** directory.

The site Help files are contained in the zip file **UXxXxLxx.zip** and is to be extracted to the **\QS\Web\HELP** subdirectory.

The subdirectory content is as follows:

- Data - Active Server Pages (ASP) files
- Class - Java class directory
- Help - Web-based help files
- Images - Images (and JavaScript) directory

Strip chart applet and screen size applet

In Netscape, resizing the browser window does not resize the applet until you refresh. This is a property of the Netscape browser, and not related to our applet.

When used across international boundaries, the date/time on the strip will be the date/time at the server, but the months will use the client's translations.

When **Daylight Saving Time** (**DST**) switches (April and October in the USA), the times on the strip chart will not switch. If you start the applet in Daylight Saving Time, all times will appear as DST, whether the actual switch occurs before or after.

Although the strip chart looks **real**, it is not. It does not contain the event marks or annotations from the original.

Rips in the strip chart indicate periods when the data was not available. One possible reason could be the fetal monitor is/was off.

On some older browsers, the VCR controls may be replaced by a scroll bar.

The applets log diagnostic information to the Java console. In Netscape Communicator, the console under **Communicator -> Tools -> Java Console**. In IE, it is under **View -> Java Console**.

After a patient ID change, the applet will stop collecting data. Return to the patient select screen and grab the correct patient.

Browser setup

In order to use OB Link, both Cookies and JavaScript must be enabled. JavaScript (also known as Microsoft Virtual Machine) may need to be downloaded/installed from the Microsoft web-site.

Under Internet Explorer (4.01 SP2 and subsequent), HTTP 1.1 protocol must NOT be enabled. To disable, do the following:

From the menu, under **View**, select **Internet Options**.

Select the **Advanced** tab.

Scroll down to **HTTP 1.1 Settings** and uncheck **Use HTTP 1.1**.

If this option is enabled, the Java applet may lock up and binary data may appear in the browser window. If this happens, disable the setting and restart the browser.

Certificate installation

To avoid the dialogs informing the user that the site is not trusted, the Certificate Authority must be installed at the client as a Trusted Root Authority. Follow the link from the first OB Link page, then use the following instructions, depending on the client browser.

NOTE

Certificate installation must be performed by a user logged on as an **Administrator**.

Internet Explorer 4.01

When the **File Download** dialog appears, select **Open this file from its current location**, then press the **OK** button. On the **New Site Certificate** dialog, ensure **Enable Certificate** is checked. You may leave all of the others checked, but at the very least, **Network server authentication** must be checked. Then click **Yes** on the following dialog to add the authority to your browser.

Internet Explorer 5.0 and higher

When the **File Download** dialog appears, select **Open this file from its current location**, then press the **OK** button. On the **Certificate** dialog, press the **Install Certificate...** button to invoke the **Certificate Manager Import Wizard** dialog. Press the **Next>** button and select **Place all certificates into the following store**. Press the **Browse** button next to **Certificate store** and select **Trusted Root Certification Authorities**. Press **OK**, press **Next**, and then **Finish**. On the **Root Certificate Store** dialog, press **Yes** to add the authority to your browser. Press **OK**.

Netscape 4.5 and higher

Walk through the **New Certificate Authority** dialogs. When prompted to select the certificate's purpose, check off **Accept this Certificate Authority for Certifying network sites**. When prompted to enter a **Nickname**, enter **GE** (this is really up to you, but should be something meaningful in case the certificate needs to be retrieved).

Server Startup Process

Figure 10 illustrates the server startup process. In short, the QSServer service calls a number of batch files, resulting in the consecutive startup of all configured QS processes.

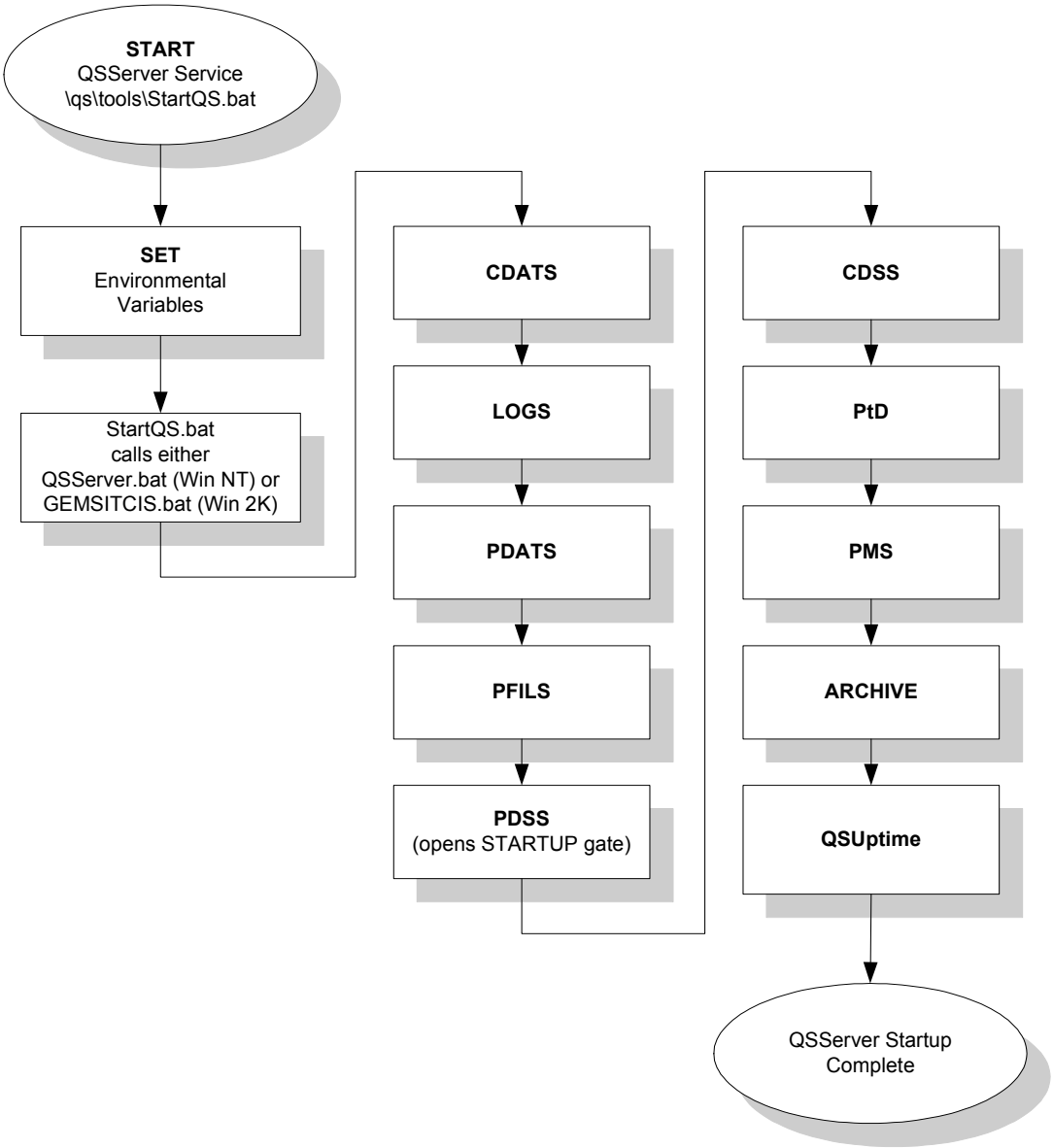

Figure 10: QS Server Startup Process

Client Startup Process

Figure 11 illustrates the client workstation startup process. In short, the QSServer service calls a number of batch files, resulting in the consecutive startup of all configured QS processes.

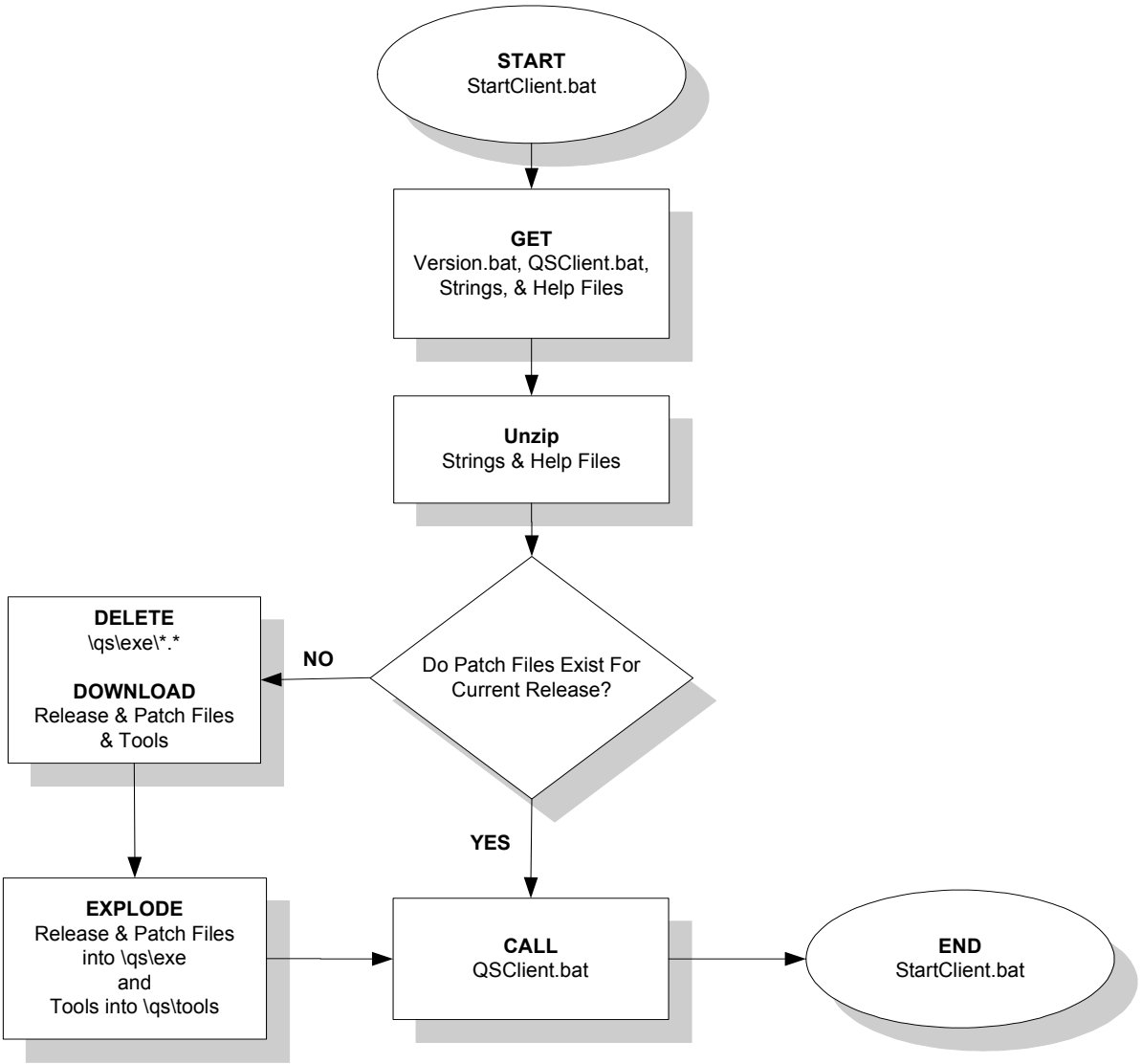

Figure 11: QS Client Startup Process

UTILITY PROGRAMS

QS utility programs are essentially software tools that allow System Managers to quickly and efficiently perform support tasks that maintain an optimal QS operational state. These utility programs are identified below and described in the subsequent paragraphs.

CDATDisp	CDUpdate	Designer
QSCopy	QSTest	

CDATDisp

This utility is designed to output the formatted values of selected CDAT tables to a file. This utility may differ with each version of the QS. The utility requires input of a file name that will contain the formatted dump and the CDAT table(s) to dump. It allows inspection of a site's current configuration without having to run the QS Designer. CDATDISP.EXE is found in **\qs\exe** and is part of the release.

CDUpdate

This utility is different for each version of the QS, because its purpose is to update the CDAT information as needed for a particular version of the QS. The most that can be said in terms of a general design is that CDUPDATE writes questions to the screen, and based on the user's response, opens and modifies CDAT tables. This tool is used to update a site from one QS version to the next.

This utility also allows setting of the site's licenses, setting the IP addresses of workstations and servers and setting the maximum number of users that can connect to the OB Link web site at a time. CDUpdate will only run on the QSServer (location of the site tables). If the QSServer has an IP address different from the address that is configured in the site tables, CDUpdate can still be run with the *standalone* parameter:

cdupdate standalone

The CDUpdate.exe program is located within the **\qs\exe** directory.

Designer

The Designer is the main QS configuration tool. It is a Windows-based graphical user interface that allows System Managers to modify the site's configuration to suit the institution's particular needs. Depending on the QS licenses bought (e.g. MAR, Customize).

If the QS system is down, the Designer can still be started on the computer where the site tables reside by making the following entry at a command prompt:

designer standalone nocdats opengate node=qsserver (or current server name in the site tables)

The Designer.exe program is located within the **\qs\exe** directory.

QSCopy

QSCopy is the utility that is responsible for copying configuration data from a QSServer to a backup server. By default, QSCopy will copy the configuration data once per hour to a computer called BKSERVER. The default copy interval and target computer name can be changed by specifying these two parameters on the command line:

QSCopy <target> <interval>

where **<interval>** is the copy interval in seconds (default is 3600), target is the computer name of the server the data is copied to.

The QSCopy.bat utility is located within the **\qs\tools** directory.

QSTest

This utility tests the communications to the PDSS, PFILS and PDATS processes running on a system. It has one optional run time parameter **logfile**. With out logfile specified output will give one screen of information per process and will clear the screen between processes. With logfile specified, the output will stream up the screen. With logfile specified, the output can be redirected to a file or printer for review.

QS TOOLS - VERSION 6.60.0

Table 4 is an alphabetical list of files (tools) with a brief description of their intended use. These files are provided within a self-extracting file titled **T6600L14.EXE** . All ***.BAT**, ***.TPL**, *registry modification files* and ***.CMD** files are the property of GEMS-IT. The majority of the ***.EXE** files were provided by the **Windows NT/2000 Server Resource Kit**.e:

Table 4: Content of T6600l14.EXE

FILE NAME	WHERE USED	INTENDED PURPOSE
AddFTPUser.bat	NT4/W2k server	Creates the QSFTP account.
ALLACLS.bat	NT4/W2k server	This file uses XCACLS.EXE to set the NT permissions on drives D:, E:, F:, and G: (for NT4) and D: (for W2k) to the permissions specified for productions systems.
ATRLS_CV.zip	NT4 Server	Telnet software used for remote support. Requires license purchase for install.
AuditTrail.bat	NT4/W2k server	Used to maintain audit logs on D: or E: to avoid using too much space.
BEEP.exe	Any	Used to create an audible beep through the PC system speaker.
BKServer.tpl	NT4 Server	BKServer.bat template file.
ChangeQSClientService.exe	Client, Loadshare	Used to set the QSClient Service to start in the context of the QS account. This permits access to QSServer resources via NetBios file transfer.
CHOICE.exe	Any	Used to create menu selections in batch files. (i.e. Status.bat)

Table 4: Content of T6600l14.EXE

FILE NAME	WHERE USED	INTENDED PURPOSE
ClientCFG.bat	Client	Used to extract registry information to a file for troubleshooting.
Con2prt.exe	Client, Loadshare	Used in Printer.bat to connect to shares on another computer on the network.
ConfigServer.bat	NT4 Server	Configures the server for use with the QS. Creates directory structure, sets environment variables and loads registry settings (see QSServerRegistry.txt), installs Telnet, creates and configures user accounts, creates network shares, installs time sync service, sets NT file and directory permissions via ALLACLS.bat, copies Tools.bat and QSI-Cons.tpl to the **D:\qs\release\nt** directory, creates desktop shortcuts (QS Shutdown, QS Status and Command Prompt). This file will require the user to specify, via the command line, the tables to install on the system at the time of execution. The specified tables (filename.zip) will be unzipped to the **D:\qs\site** directory.
Cshell.bat	Any	Used to control error handling for each QS process (Stop, cycle, system reboot, etc.).
cygwinb19.dll	Any	Provides Unix tool compatibility for NT
DumpEL.exe	Any	Used to retrieve the NT Event Viewer log from a machine for troubleshooting purposes.
FixKill.bat	NT4/W2k Client	Corrects the registry setting for the debugger – kill.exe; called by Tools.bat
Fonts.bat	Any	Automates loading of QS fonts on any machine that will run QPM or Designer
Freedisk.exe	NT4/W2k Server	Used in various batch files to check for minimum free hard drive space.
GetQS.txt	NT4/W2k Client, Loadshare	Used by the FTP program to automate retrieval of files from a QSSERVER. Specifies the username and password to connect as and directory where QS files are retrieved. Called out in StartClient.bat
GetQSexe.txt	NT4/W2k Client, Loadshare	Used by the FTP program to automate retrieval of files from a QSSERVER. Specifies the server to connect to, username and password to connect as and directory where executable files are retrieved. Called out in StartClient.bat
GetUpTime.bat	NT4/W2k Server	Creates a zip file containing logs for uptime statistics
Grep.exe	Any	Used to search text/log files for specific strings of text.
Gunzip.exe	Any	Zip utility

Table 4: Content of T6600l14.EXE

FILE NAME	WHERE USED	INTENDED PURPOSE
Gzip.exe	Any	Same as Gunzip.exe
Head.exe	Any	Used to retrieve the first few lines from a text/log file and display it on the screen.
Hidden.exe	Any	Used to hide the task bar program button from users.
IfMember.exe	Any	Checks a user name for group membership.
InstallOBlink.bat	NT4 Server/ Loadshare	Used to prepare the system for OBLink installation. Not for use on Win2k systems.
InstallQS.bat	Client	Uses command line variables to install the QS configuration. Sets the auto-logon user and password.
InstallVNCSetupISS.txt	Any	Installation script for WinVNC. Used by installation batch file.
Instsrv.exe	Any	Used configuration batch files to install a specified service. (i.e. QSSERVER service)
InstallVNC.bat	Any	Used to automatically install WinVNC. Requires SP4 or higher.
Kill.exe	Any	Used to stop processes.
KillTree.exe	NT/W2k Server	Executable targeted for the cluster server to kill a QS server process and its parent. This is only to be used with QS process started with CSHELL.
Logfile.bat	Any	Used to capture state of system processes and log files – outputs to various files.
Loaddskf.exe	Any	Utility for loading a floppy image from a file saved with Savedskf.exe
MakeBackup.bat	NT4 Server	Convert a QS server to a BK server
MakePrimary.bat	NT4 Server	Convert a BK server to a QS server
NewSID.exe	Any	Executed on a system after applying a “Ghost” image to the hard drive. Generates a unique Security Identifier for the machine.
Now.exe	Any	Displays Date and Time. Used in batch files to log this information.
NTFonts.txt	Any	Installs Fonts
NTPrivs.exe	Any	Used by InstallQS.bat and ConfigServer.bat to modify user privileges
OBLINK.VBS	W2K Server/ Loadshare	Used to install configure IIS to support OBLINK on Win2k Servers
OS2Fonts.txt	Any	Installs QS OS/2 Fonts on an NT workstation

Table 4: Content of T6600l14.EXE

FILE NAME	WHERE USED	INTENDED PURPOSE
Pathman.exe	Any	Add / Delete path variables
Printkey.exe	Client	Used to print the display when the Print Screen key is pressed.
QMlUse.bat	Any	Used to map a drive to a share on another machine. Command line variables are required.
QSAtJobs.tpl	NT4/W2k Server	Renamed to QSAtJobs.bat and called by Config-Server.bat and MakePrimary.Bat to setup scheduled jobs to run at specific times.
QSBackup.bat	NT4/W2k Server	Scheduled to run as an “AT” job by QSAtJobs.bat to backup specific files to a specified backup drive and/or Backup server every 8 hours.
QSChange.bat	NT4/W2k Client	Used to change QSUPDATE and QSBASEPORT environment variable registry settings.
QSClient.tpl	NT4/W2k Client	This file is customized on a per site basis for starting process on specified or generic clients. QSClient.bat resides in **D:\qs\release\nt** on the server.
QSCopy.bat	NT4/W2k Server	Called from QSSERVER.bat to copy backup files to the BKSERVER or other specified location every 3600 seconds.
QSIcons.bat	NT4/W2k Client	Called by QSClient.bat to configure the shortcuts in the Program menu. It will remove older shortcuts if they are found.
QSLocalAccount.bat	NT4/W2k Server	Used by InstallShield on Win2k server for setting privileges.
QSServer.tpl	NT4/W2k Server	Template file that can be renamed to QSSERVER.bat for starting of the QS processes. Resides in **D:\qs\release\nt** on the server.
QSServerRegistry.txt	NT4 Server	Contains registry settings required for QS operation. Called by regini.exe in ConfigServer.bat
QSTimeServ.bat	Client, Loadshare	Creates a new TimeServ.ini file based on the value of QSUPDATE; places in %WinDir%, stops the time service, updates the registry and starts the service again. Will run automatically, upon reboot, if the QSUPDATE variable changes.
Qstop.bat	Any	Used to stop QS processes on any machine on the QS network. Requires CDATS to function.
Qsuser.txt	Client, Loadshare	Contains a registry setting that sets the auto-logon user to QSUSER. Called by regini.exe in various batch files. May also be run from the command line with regini.exe to reset the auto-logon user back to QSUSER (not needed on Win2K)

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Table 4: Content of T6600l14.EXE

FILE NAME	WHERE USED	INTENDED PURPOSE
QSWkly.bat	NT4/W2k Server	Scheduled to run as an "AT" job by QSAtJobs.bat to backup specific files to a specified backup drive and/or Backup server on a weekly basis.
Rclient.exe	Any	Used primarily by Tech Support for remote command line abilities. Runs as a service. See **Rsetup.exe** for installation information.
Rconmode.exe	Any	Enables you to change the screen buffer size and the window size of the current console. The syntax is: rconmode bufferx,buffery,windowx,windowy **Where:** bufferx is the screen buffer width in characters. buffery is the screen buffer height in characters. windowx is the window width in characters. windowy is the window height in characters. For example, the following command changes the screen buffer size to 80 x 500 and the window size to 80 x 50: rconmode 80,500,80,50
Rconmsg.dll	Any	Rconsole file
RconStat.exe	Any	Lists all current remote console connections
Rconsvc.exe	Any	Used to control services on a remote machine.
Rcruncmd.exe	Any	Used to run programs /executables on a remote machine.
Reg.exe	Any	Registry query and modification tool.
RegDmp.Exe	Any	Utility for dumping specified registry information to a file.
Regini.exe	Any	Used to process text files that contain registry settings. Inserts the contents of the text file in to the registry.
RoboCopy.exe	Any	Used to synchronize files between networked computers.
Rsetup.exe	Any	Locally or remotely install Remote Console service. (rsetup <computername>)
SaveDskf.exe	Any	Used to create exact duplicate floppy image files that can be loaded to other floppies using LOADDSKF.EXE.

Table 4: Content of T6600l14.EXE

FILE NAME	WHERE USED	INTENDED PURPOSE
SC.Exe	Any	Utility to obtain detailed information about Windows NT services
SetNetBIOSTransfer.BAT	Any	Calls ChangeQSClientService.Exe to modify the QSClient Service to use the QS account and new password; Sets METHOD=NET.
Shortcut.exe	Any	Used to create shortcut links to programs. Called by ConfigServer.bat and QSIcons.bat
Shutdown.exe	Any	Used to shutdown or reboot the local or remote windows computer
Sleep.exe	Any	Used to delay batch file progression. Stops progression by specified number of seconds.
Srvany.exe	Any	Used to start QS processes via a specified service.
SrvMgr.exe	Any	Used to remotely manage services and shares.
StartClient.bat	Client, Loadshare	Called by the QSClient service to configure and load the QS client software.
Startdes.bat	Client, Loadshare	Used to start the designer after other necessary QS process have completed.
StartQPM.bat	Client, Loadshare	Used to start QPM after other necessary QS processes have completed
StartQS.bat	NT4/W2k Server	Called by the QSSERVER service to set/verify the system configuration and start QS processes via QSSERVER.bat. If run on a Cluster server it will stop QS processes, via Killtree.exe, that may be running before attempting to start them again.
Status.bat	Server	Used to display a menu of processes. Menu selections will cause the status of the process to be displayed on the screen.
StopQS.bat	Any	Attempts to stop all possible QS processes on the machine it is run on. Similar to Qstop.bat which only stop processes found running.
Stub.exe	Any	QS Icon file associated with QS programs. Changes the default icon to that of the QS Icon. Called out in ConfigServer.bat and QSIcons.bat for use by shortcut.exe
Tail.exe	Any	Used to display the last few lines of a text/log file. Dynamically displays entries to the file as they are appended.
Timeserv.client	Client, Loadshare	Template file used with Timeserv.exe for synchronizing the computer clock with the QS server. Edit this file to change the time source / connection method used by the computer.

Table 4: Content of T6600l14.EXE

FILE NAME	WHERE USED	INTENDED PURPOSE
TimeServ.dll		Required for function of TimeServ.exe
TimeServ.exe	Any	Installed as a service by ConfigServer.bat, ConfigWS.bat and InstallQS.bat. Synchronizes the computer clock with an outside source on a scheduled basis.
TimeServ.server	NT4/W2k Server	Template file used with Timeserv.exe for synchronizing the computer clock with an outside source. Edit this file to change the time source / connection method used by the computer.
Tlist.exe	Any	Used to show a list of running programs on a computer.
Tools.bat	Client, Loadshare	Automatically installs/re-installs the tools version. Uses the version specified in Version.bat or hard coded version if not set by Version.bat. Creates flag file when complete. NOTE: New tools are copied to the workstation only when the release file is not found in \qs\exe.
Unzip.exe	Any	Used to un-compress files that have been compressed using Zip.exe
Unzipsfx.exe	Any	Unzip tool
Vnc333r9.zip	Any	Compressed file containing the WinVNC program that may be setup on a computer to provide remote desktop viewing.
VNCset.reg	Any	Registry settings for auto VNC install via INSTVNC.BAT
Xcacls.exe	Any	Used to edit or view NTFS permissions.
Zip.exe	Any	Used to compress the size of a file or files. Reduces storage space required and accelerates uploading/ downloading of files.

Chapter 2

Process Control & Status

INTRODUCTION

The dialog pictured in Figure 12 is used to issue administrative (operational) commands to QS processes. These processes allow users to *view specific process status* and *set process operational parameters*. The as-delivered configuration of the QS makes this dialog available via the **Network** menu **Commands** option; however, QS System Managers at configurable sites may use QS Designer to assign the **Network Commands** action to any navigator element.The various control elements of this dialog are summarized in Table 5.

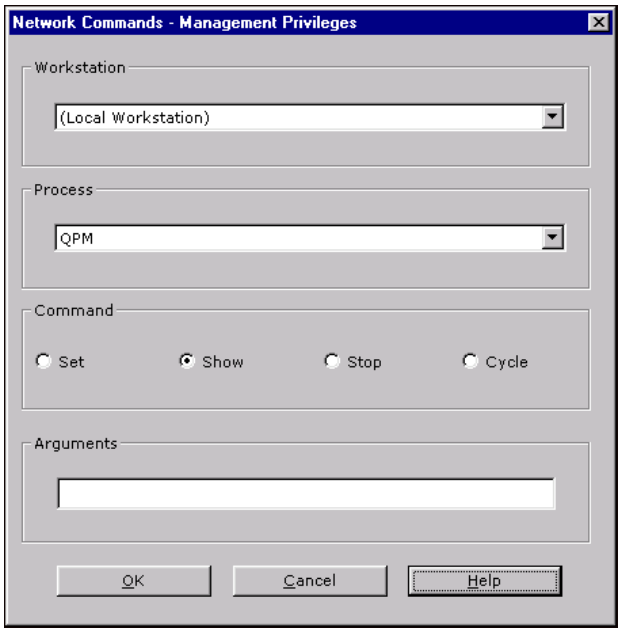

Figure 12: Network Commands Dialog

The operation of the dialog's command buttons is consistent with other QS dialogs in that use of the **OK** command button initiates performance of the currently specified process commands (as indicated by the entries within the data fields and radio button status). The **Cancel** command button removes the dialog from the workstation display without initiating any further actions. Selection of the **Help** command button provides access to information about this dialog and the processes that it controls.

Table 5: Network Commands Dialog - Component Descriptions

Control/Element	Description
Workstation	Allows you to specify which workstations that the dialog will be accessing/controlling. You may select any workstation configured as part of the QS, the current (local) workstation or all workstations as the focus of the action or status check being requested.
Process	Allows you to select the specific process of interest. Each of the process options is described in the paragraphs that follow this table.
Command	Allows you to select one of four radio buttons to indicate the preferred action to be performed - **Set**, **Show**, **Stop**, and **Cycle**. **Set** - Allows you to change the operational parameters of the selected process on the specified workstation(s). **Show** - Allows you to view status (statistics) of the selected process on the specified workstation(s). **Stop** - Causes the selected process to cease operation. In general, this option should not be used unless directed by a member of QS Customer Support. Questions should be directed to the QS Help number listed within this document. The use of arguments is not appropriate for this command. **Cycle** - Allows you to stop and restart the selected process. It is generally used after the QS configuration has been modified by a QS System Manager. If you are unfamiliar with the cycling of processes, please contact QS Customer Support for directions. **Note**: The cycle command will only work if the QS is operating under CShell. Otherwise, the process will stop and not restart.
Arguments	QS process commands may be be defined in greater detail through appropriate entries in the **Argument** field. Arguments appropriate for the various QS processes are described within the process descriptions that follow this table.

QS PROCESSES

The following processes may be controlled using the **Network Commands** dialog.

ARCHIVE	LAS	PTD
BRELAY	LOGS	QPM
CDATS	PDATS	QS Connect
CDSS	PDSS	SPP
HIS-HL7	PFILS	
HIS-HL7O	PMS	

PROCESS ARGUMENTS

Users may specify operational parameters (referred to as arguments) that control the performance of either a set or show command. Since arguments vary from process to process, each command available for use with each QS process is described within the following appropriately labeled paragraphs. Users may also view the arguments available for each command by entering **Help** into the argument field with either the **Set** or the **Show** command.

Please note that arguments are not used in conjunction with the **Stop** command.

Archive Arguments

If a termination admin command (stop, cycle, cycle with reboot) is received, Archive will delay termination until the current archival process is complete.

SET

VERBOSE=TRUE causes ARCHIVE to log and show INFORMATIONAL messages.

VERBOSE=FALSE causes ARCHIVE to ignore INFORMATIONAL messages.

ARCHIVE causes the immediate archival of data to CD-R unless the server is in a HOLD state.

HOLD prevents patient file preparation and archival until a RESUME command is received or the Archive server is rebooted.

INTERVAL=mm sets the minutes between periodic passes for file preparation and potential archival. mm must be from 1-1440. If =mm is not specified, an interval will be triggered without writing to CD-R, unless TIME_SPAN or MB_DATA criteria are met.

MB_DATA=bb sets the megabytes of data in the staging area that will trigger archival to long term storage media. bb must be from 2-600.

TIME_SPAN=dd sets the number of days since the last archive that will trigger archival to long term storage media. dd must be from 1-365.

RESUME permits Archive to process data when the next interval expires.

SHOW

STATUS presents the standard server screen

STATUS=SUMMARY provides a translatable (internationalizable) summary of the Archive status. This information can be requested on demand by user via QPM. QPM simply sends this admin command to Archive and puts the resulting text in a message box.

BRelay Arguments

SET

CHALKBOARD=FALSE causes Chalkboard messages NOT to be broadcast.

FETALWAVE=TRUE causes FetalWave messages to be broadcast.

FETALWAVE=FALSE causes FetalWave messages NOT to be broadcast.

GATEKEEP=TRUE causes Gatekeeper messages to be broadcast.

GATEKEEP=FALSE causes Gatekeeper messages NOT to be broadcast.

HEARTBEAT=TRUE causes Heartbeat messages to be broadcast.

HEARTBEAT=FALSE causes Heartbeat messages NOT to be broadcast.

LOCATOR=TRUE causes Locator messages to be broadcast.

LOCATOR=FALSE causes Locator messages NOT to be broadcast.

NOTIFY=TRUE causes Notification messages to be broadcast.

NOTIFY=FALSE causes Notification messages NOT to be broadcast.

TIME=TRUE causes Time Synchronization messages to be broadcast.

TIME=FALSE causes Time Synchronization messages NOT to be broadcast.

WATCHDOG=TRUE causes WatchDog messages to be broadcast.

WATCHDOG=FALSE causes WatchDog messages NOT to be broadcast.

ALLMSG=TRUE causes all received messages to be broadcast.

ALLMSG=FALSE causes all received messages NOT to be broadcast.

RESETCOUNT resets the Process Status screen counts.

VERBOSE=TRUE enables informational message logging.

VERBOSE=FALSE disables informational message logging.

SHOW

STATS shows the current QS statistics.

STATUS shows operational information about BRELAY. This is the default SHOW option.

CDATS Arguments

SET

BACKUP=[Filename] will BACKUP to current working CDAT tables and place them in a compressed file with the given filename in the CDATBACK directory.

BASEHOUR=HH sets the starting hour for verify passes hour. HH must be a value from 0 to 23.

INTERVAL=MM sets the minutes between periodic verify passes. MM must be 60, 120, 180, 240, 360, 480, 720 or 1440.

LOCK=TRUE creates a CDAT.LCK file and holds all updates

LOCK=FALSE deletes the CDAT.LCK and allows CDAT updates to be resumed

MODIFY=HOLD holds all CDAT updates

MODIFY=RESUME allows CDAT updates to be resumed

NEWLOGS closes the current log files and opens new ones.

RESTORE=[filename] restores a compressed file of CDAT tables from the CDATBACK directory and places them in use.

UPDATE forces a save of the current CDAT tables by copying .000 to .001, .001 to .002, etc.

VERBOSE=TRUE enables informational message logging.

VERBOSE=FALSE disables informational message logging.

VERIFY initiates verification of the CDAT tables.

SHOW

INFO displays the path of the CDAT tables, and summary information on each CDAT table version.

STATS displays the current CDATS metrics and QS statistics.

STATUS shows operational information about STATUS.

CDSS Arguments

SET

BASEHOUR=x sets hour of the day that the verify interval is started on. The valid range for 'x' is 0 to 23.

INTERVAL=x sets the minutes between periodic verify passes. The valid entries are 60, 120, 180, 240, 360, 480, 720 or 1440.

SETSELECTPT=PtId signifies that a patient has been selected by a QPM.

VERBOSE=TRUE enables informational message logging.

VERBOSE=FALSE disables informational message logging.

VERIFY[=PtId] initiates an immediate verify pass. The patient to verify may optionally be specified.

SHOW

ACTIVE shows the active CDSClient workstations.

DUMPCACHE[=PtId] shows Cached data. If no patient id is given, the patients cached will be displayed. If a patient id is given, the items stored for that patient are displayed.

STATS returns the current QS statistics.

STATUS shows operational information about CDS.

HIS-HL7 (Inbound) Arguments

SET

ADT=TRUE enables ADT processing.

ADT=FALSE disables ADT processing.

FLUSH=TRUE disables all HL7 processing. Use with EXTREME CAUTION!!! A number of transactions to FLUSH may be specified instead of TRUE.

FLUSH=FALSE re-enables HL7 processing.

LAB=TRUE enables LAB processing.

LAB=FALSE disables LAB processing.

NEWLOG closes the current log file and opens a new one.

ORDER=TRUE enables Order processing.

ORDER=FALSE disables Order processing.

TRACE=TRUE enables ComPort tracing on the HL7 Lower Level Protocol.

TRACE=FALSE disables ComPort tracing.

TXACT=TRUE enables transaction logging.

TXACT=FALSE disables transaction logging.

VERBOSE=TRUE enables informational message logging.

VERBOSE=FALSE disables informational message logging.

HIS-HL7O (Outbound) Arguments

SHOW

STATS will display the current metrics and QS statistics.

STATUS shows operational information about STATUS.

SET

NEWLOG closes the current log file and opens a new one.

ROUTER=TRUE enables Results to be transmitted.

ROUTER=FALSE disables Results to be transmitted.

SERVER=TRUE enables Outbound requests.

SERVER=FALSE disables Outbound requests.

TXACT=TRUE enables transaction logging.

TXACT=FALSE disables transaction logging.

VERBOSE=TRUE enables informational message logging.

VERBOSE=FALSE disables informational message logging.

LAS Arguments

SET

DATA[=ALL | ADT | LABDIR | LABDATA | LABNOTE | RWHAT] enables data logging on the type of data selected. If none of the optional data types is specified, ALL is logged.

[NO]DEBUGMODE enables or disables debug data logging.

NODATA[=ALL | ADT | LABDIR | LABDATA | LABNOTE | RWHAT] disables data logging on the type of data selected. If none of the optional data types is specified, ALL is logged.

VERBOSE=TRUE enables informational message logging.

VERBOSE=FALSE disables informational message logging.

SHOW

MLIST[=IP_ADDRESS] returns the current entries in the monitor list. The IP address of the monitor to list may optionally be specified.

STATS returns the current QS statistics.

STATUS shows operational information about CDS.

LOGS Arguments

SET

NEWLOGS closes the current log file and opens a new one.

NEWSTATS closes the current stat file and opens a new one.

SHOW

STATSreturns the current QS statistics.

STATUS shows operational information about LOGS.

PDATS Arguments

SET

METRICS=NN sets the per slot performance metrics interval to the specified value (in minutes). NN must have a value between 1 and 1440, inclusive.

RESET METRICS resets (zeros) the total performance metrics.

VERBOSE=TRUE enables informational message logging.

VERBOSE=FALSE disables informational message logging.

SHOW

PATIENT=PTID shows detailed information on the specified patient(s). Wildcard characters of '*' and '?' may be used in the PTID.

SLOTS[=start-stop] shows the patients in the specified slots.

STATS shows the current PDATS metrics and QS statistics.

STATUS shows operational information about PDATS.

TABLES shows the CDAT tables in use.

PDSS Arguments

SET

BASEHOUR=HH sets the starting hour for verify passes hour. HH must be a value from 0 to 23.

INTERVAL=MM sets the minutes between periodic verify passes. MM must be 60, 120, 180, 240, 360, 480, 720 or 1440.

LOAD=PtId[@Workstation] loads the specified patient in PDATS. The workstation to load the patient at may optionally be specified.

NEWLOGS closes the current log files and opens new ones.

PURGE=PtId deletes the specified patient from the system!!!

RESTORE=PtId@Workstation restores the specified patient. The patient's data must reside in the PFILS directory on the specified workstation.

UNLOAD=PtId unloads (drops) the specified patient from PDATS.

VERBOSE=TRUE enables informational message logging.

VERBOSE=FALSE disables informational message logging.

VERIFY[=PtId] initiates an immediate verify pass. The patient to verify may optionally be specified. If '*' is specified, a verify on ALL patients will be initiated.

SHOW

BEDMAP shows the patient id for each occupied bed.

PATIENTS WHERE CRITERIA=VALUE[, CRITERIA=VALUE][, FULL] shows roster information for selected patients. One or more selection criteria may be specified. Criteria are logically ORed. Valid criteria are: ATTEND, BED, GROUP, ID, INFO, NAME, PDATS, PFILS, SERVICE, UNIT. Selected information for each patient will be shown unless FULL is specified.

PATIENTS ALL[FULL] shows roster information for all patients. Selected information for each patient will be shown unless FULL is specified.

PDATS shows MAX, USED, and FREE slots for each PDATS.

PFILS shows the number of patients served and disk space available for each PFILS.

PTDELTA=ID shows the current PtDelta values for the given Patient ID.

STATS will return the current QS statistics.

STATUS shows operational information about PDSS.

TABLES shows the CDAT tables in use.

PFILS Arguments

SET

BASEHOUR=x sets hour of the day that the verify interval is started on. The valid range for 'x' is 0 to 23.

BCACHE=# sets the number of backup file handles to be cached. The range must be between 10 and 1024 inclusive.

COPY=PTID>FILENAME causes PFILS to copy the patient record to the specified file.

DROP=PTID causes PFILS to end serving the patient PTID. May be suffixed with the modifier /BINARY to force a binary (non-text) return code. May be suffixed with the modifier /RENAME to cause PFILS to end serving the patient PTID and rename the data file, or with the modifier /DELETE to cause PFILS to end serving the patient PTID and delete the data file.

INTERVAL=x sets the minutes between periodic verify passes. The valid entries are 60, 120, 180, 240, 360, 480, 720 or 1440.

PCACHE=# sets the number of primary file handles to be cached. The range must be between 60 and 6144 inclusive.

REENUMERATE removes patients from the Work List that there are not any files for them. Initiates service for patients that are not in the Work List.

SERVE=PTID causes PFILS to begin serving the patient PTID. May be suffixed with the modifier /BINARY to force a binary (non-text) return code. May be suffixed with the modifier /CREATE to cause PFILS to create the data file and begin serving the patient PTID.

VERBOSE=TRUE causes PFILS to log and show INFORMATIONAL messages.

VERBOSE=FALSE causes PFILS to ignore INFORMATIONAL messages.

VERIFY[=PtId] initiates an immediate verify pass. The patient to verify may optionally be specified.

ZEROASTATS resets the total Append Statistics to zero.

ZEROCSTATS resets the Cache Hit/Miss Counts to zero.

SHOW

ASTATS returns the current append performance statistics.

CSTATS returns the current cache performance statistics.

HSTATS returns the current work list hashing distribution statistics.

MSTATS returns the current Merge statistics.

PATIENT=PTID[/BINARY] returns a list of detailed information on the given patient.The wildcard characters of '*' and '?' may be used in the PTID. BINARY will cause PFILS to respond to the SHOW command in an internal format useful only to PFILSC.

SLOTS=[start-stop] returns a list of patients in the Work List in the range of slots given.

STATUS returns the current Process Status. This is the default SHOW option.

STATS returns the current QS statistics.

PMS Arguments

SET

System Modes

/[NO]CHECKSKEW enables/disables checking for skewing on monitor timestamps.

/[NO]MISSEDSTORE enables/disables missed storage interval processing.

/[NO]STOREALARMS enables/disables storing data when the monitor is in alarm.

/[NO]VERBOSE enables/disables informational message logging.

Note

For the following stored procedure parameters, x can have any of the following values: ALL, NONE, ECG, VITALSIGNS, TEMPERATURE, OXYGENATION, VENTILATOR, CARDIACCALCS, FIXED, FETALMONITORINGA + sign can be used to combine the options. The default value is ALL.

/STPROCABG=x sets what PMS item types to store when the Arterial Blood Gas stored procedure is stored.

/STPROCCO=x sets what PMS item types to store when the Cardiac Output stored procedure or Cardiac Calculations are stored.

/STPROCPC=x sets what PMS item types to store when Pulmonary Cardiac Calculations are stored.

/STPROCNBP=x sets what PMS item types to store when the NIBP stored procedure is stored.

/STPROCWP=x sets what PMS item types to store when the Wedge Pressure stored procedure is stored.

SYNC ? shows a summary of Unity Time Sync commands and parameters

SYNC=[0, 1, or 2] 0 disables Unity time master synchronization. 1 enables Unity time master synchronization. 2 performs a one-time immediate time sync with the Unity network.

SYNCTIME=[0000..2359] sets the time of day at which the server synchronizes its time with the Unity network.

SYNC_QUOTA=[0..255] sets the maximum number of times per day synchronization takes place.

SYNC_DRIFT=[1..255] sets the maximum time difference allowed between QSServer and Unity network time master before synchronization takes place.

Per Acquire

/ACQUIRE=Name Selects the Acquire task that you wish to control.

/NEWLOG Cycles the current message log file for the selected Acquire task.

/[NO]DATA Enables/disables data logging on the selected Acquire task.

/[NO]TRACE Enables/disables ComPort tracing on the selected Acquire task.

Per Bed

/BED=Name selects the Bed that you wish to control.

/ACK acknowledges a notification on the selected Bed.

/[NO]DATA enables/disables data logging on the selected Bed.

/[NO]NOTIFY enables/disables notifications on the selected Bed.

/HI=LIMIT, DURATION, RECOVERY, RESET changes Hi settings on the selected Bed.LIMIT range is 30 to 240 bpm and Hi must be at least 10 greater than Lo. DURATION/RECOVERY range is 1-600 seconds, RESET range is 1 to 3600 seconds.

/LO=LIMIT, DURATION, RECOVERY, RESET changes Lo settings on the selected Bed.LIMIT range is 30 to 240 bpm and Hi must be at least 10 greater than Lo. DURATION/RECOVERY range is 0-120 seconds. RESET range is 1 to 3600 seconds.

/PEN=DURATION, RECOVERY, RESET changes Penlift settings on the selected Bed.LIMIT range is 30 to 240 bpm and Hi must be at least 10 greater than Lo. DURATION/RECOVERY range is 1-300 seconds. RESET range is 1 to 3600 seconds.

/TACHY=VALUE changes Tachycardia MHR setting on the selected Bed.

/BRADY=VALUE changes Bradycardia MHR setting on the selected Bed.

/[NO]NOTIFY enables/disables notifications on the selected Bed.

/[NO]MATERNAL enables/disables maternal-only mode on the selected Bed.

Beds with Serial Fetal Monitor Acquire

/[NO]TRACE enables/disables ComPort tracing on the selected Bed. TRACE may be enabled for only one FM Serial bed per workstation at any time.

/CLOSEFMPORT closes the serial port to the bed's monitor.

Per Bed/Acquire

/BEDACQUIRE=BedName,AcquireName specifies the Bed-Acquire you want to control.

/[NO]DATA enables/disables data logging on the selected Bed-Acquire.

TENERRORS=mm sets PMS to cycle if ten store errors occur in mm minutes. The default is to set mm to zero which disables cycling on store errors.

SHOW

(no parameters) gives standard info.

/ACQUIRE=Name selects the Acquire task(s) that you wish to check by specifying the name of the acquire task (e.g. SerialFM). If no acquire tasks are specified, status for all tasks will be displayed.

/BED=Name selects the Bed(s) that you wish to check by specifying the bed name(s). If no bed names are specified, status on all beds will be displayed./BED=Name displays status for ALL acquires for the bed.)

/BEDACQUIRE=BedName,AcquireName selects the particular bed/acquire combination that you wish to check.

/DATA=Name displays cached parameter data for the specified bed.

/STATS displays QS statistics.

PtD Arguments

SET

Supports the following: Help, Interval, InvalidNumber, NewLog and Verbose. Only one command may be specified at a time.

ASCII Export only

INVALIDNUMBER=TEXT invalid number is exported as text string.

INVALIDNUMBER=NULL invalid number is exported as null value.

INTERVAL[=minutes] wakes up PtD and optionally changes the schedule interval to the specified minutes.

NEWLOG closes the current log file and opens a new one.

VERBOSE=TRUE enables informational message logging.

VERBOSE=FALSE disables informational message logging.

QPM Arguments

CYCLE

(no parameters) cycles the QPM program.

REBOOT restarts the workstation

SET

/[NO]VERBOSE enables/disables informational message logging.

SHOW

(no parameters) gives standard info.

STATS provides statistics info.

BEDMAP provides a list of the current Bed/Patient map.

ALL provides both info and statistics.

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QSConnect Arguments

SHOW

STATS returns the current QS statistics.

STATUS shows operational information about QSConnect.

SET

NEWLOGS closes the current log files and open new ones.

VERBOSE=TRUE enables informational message logging.

VERBOSE=FALSE disables informational message logging.

CONNECT=ConnectName/SetCommand passes the SetCommand to the specified ConnectName

Valid SetCommands are:

START initiates the specified ConnectName.

STOP terminates the specified ConnectName.

PAUSE temporarily suspends the specified ConnectName.

RESUME restarts the paused ConnectName.

DATA=ON initiates data logging on the connect.

DATA=OFF terminates data logging on the connect.

TRACE=ON initiates trace logging on the connect.

TRACE=OFF terminates trace logging on the connect.

FLUSH=TRUE enables data collection by the connect.

FLUSH=FALSE disables data collection by the connect.

VERBOSE=TRUE enables informational message logging.

VERBOSE=FALSE disables informational message logging.

SPP Arguments

SHOW

STATS returns the current QS statistics.

STATUS shows operational information about SPP.

SET

NEWLOGS closes current log files and opens new ones.

VERBOSE=TRUE enables informational message logging.

VERBOSE=FALSE disables informational message logging.

START initiates the next job running if it is scheduled to run today

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Chapter 3

Network Architecture

OVERVIEW

The QS uses networks for two basic types of communication. First is the communication amongst the QS server and its clients. Second is the collection of patient monitor data by the QS Patient Monitoring System (PMS) server.

At a high level, the QS server and its clients connect using the Internet Protocol (IP). This can operate over a variety of lower level protocols and physical media. In a Local Area Network (LAN), this is nearly always Ethernet but can be token ring as well. Such LANs can be joined to form Wide Area Networks (WANs) using various connections such as ISDN and T1 lines.

Many types of patient monitors exist, and they transmit patient data in many different forms. Thus, the QS PMS process that collects these data may have varied inputs. Fetal monitors typically feed the PMS process through serial connections either to a Digi adapter in the server, or to an Equinox box which then passes the data on to the server over the Ethernet using IP. Other monitors reach the PMS server using IP by connecting directly to the Ethernet.

Since IP on Ethernet is so prevalent, it is possible to put much of the QS's communication onto a single network. For instance, it is theoretically possible to run the QS client-server communication and some of the PMS monitor-data collection over a hospital's existing Ethernet, along with any other resident applications.

However, clinical performance requirements often dictate that the QS be put on its own Ethernet, isolated from the existing Hospital network. Further, monitor data running on IP over Ethernet is nearly always on its own GE Medical Systems Unity LAN, separating the QS client-server communication from PMS data collection. Fortunately, intelligent (switching) Ethernet hardware can minimize collisions by directing frames only to the correct LAN segments and by limiting broadcasts' collision domains with virtual LANs (VLANs). This allows the separation of the aforementioned QS client-server communication, PMS monitor data collection, and other hospital applications, despite their use of the same networking hardware.

FETAL MONITOR COMMUNICATION: DIGI & EQUINOX

Many fetal monitors can send data out over serial connections. Sometimes intermediate hardware is needed (as in the case of Sacs for certain Hewlett-Packard monitors) but basically the basic approach is the same for all. Wired serial connections are run from the monitors to a concentrator, whether a Digi or an Equinox. The concentrator gathers the output from multiple monitors and relays it on the QS's PMS process. A Digi concentrator delivers it over a dedicated Digi line to the Digi adapter card in the PMS server. An Equinox concentrator packages the serial monitor data into IP and passes them over Ethernet to the PMS process. Details of each appear in the following sections.

SERIAL COMMUNICATION: DIGI EQUIPMENT

The QS's PMS process collects data from fetal monitors via serial input. The Digi C/X system provides multiple serial ports on the PC where the PMS process resides. As many as 128 serial connections (and thus fetal monitors) can be multiplexed to a single Digi adapter. This is accomplished by connecting Digi concentrators (also called extenders), each with sixteen serial ports, to the Digi adapter. The Digi adapter's two ports will support a total of up to eight Digi extenders. These extenders can all be daisy chained to one port, or split in any amounts between the two ports. Figure 13 shows possible Digi connections.

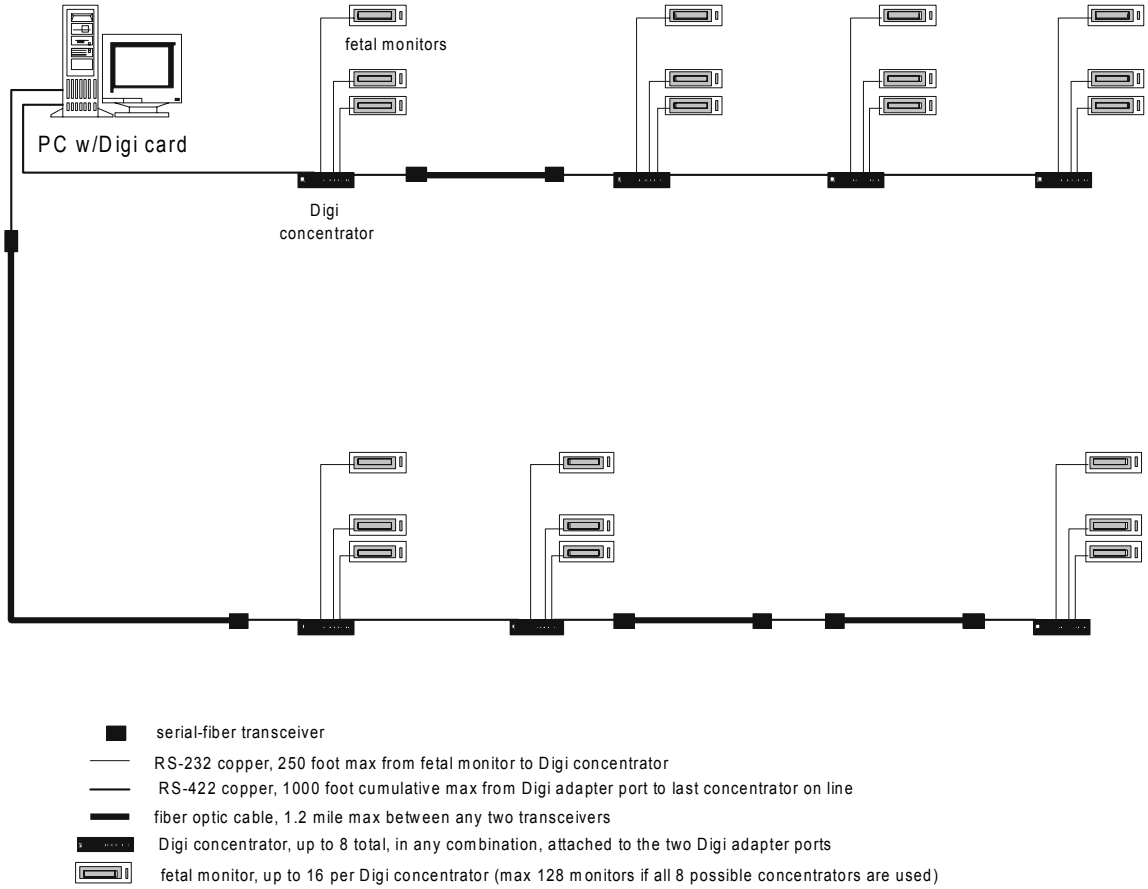

Figure 13: Digi Serial Connections

Two types of media may be used in the Digi serial network: fiber optic and copper cable. Over copper, the fetal monitor passes data via EIA-232 asynchronous serial communication to the Digi concentrator. Thus only copper cable is used to wire rooms to concentrators.

Also over copper, the concentrators connect to one another and to the Digi adapter card by way of high speed EIA-422 synchronous serial connections. However, any number of fiber segments may be inserted anywhere within any of these copper EIA-422 connections when enclosed by a pair of fiber transceivers. Thus copper and fiber may be used to wire concentrators to each other and to the Digi adapter. Because any single fiber segment can be up to 1.2 miles long, its use will allow the serial connections to span much longer distances than will the 1000 foot cumulative span of the copper cable supporting EIA 422.

Cable specifications follow, however it is important to note that CAT5 unshielded twisted pair (UTP) cable **may not** be used for the serial fetal monitoring network. The serial concentrator vendor has specified a cable type and GE must adhere to this specification due to ISO 9001 guidelines and FDA policy.

Cable Specifications

Cable requirements for commonly employed network configurations are provided in the following paragraphs.

Copper room-to-concentrator

Copper for RS-232, shielded, untwisted cable with foil and drain wire, 22 AWG installed in compliance with local codes. There is a 250 foot distance limitation from fetal monitor to serial concentrator .

Copper concentrator-to-concentrator/concentrator-to-host adapter card

Copper for RS-422, STP 4-pair, foil with drain wire, 24 AWG installed in compliance with local codes. There is a 1000 foot (cumulative) from the host adapter to the last serial concentrator on the line.

Fiber optic concentrator-to-concentrator/concentrator-to-host adapter card

Fiber Optic, Multimode 62.5mm/125mm, duplex configuration. 1.2 miles distance limitation.

NOTE

The 1000’ cumulative distance from the host adapter to the last serial concentrator still pertains when fiber is employed. The length of fiber is merely not considered in the overall measurement,

The most important characteristics of this system that need to be considered during the quote phase are:

- 16 ports (beds) per serial concentrator
- Two separate lines on the Digi controller card (typically installed in the main or load share server)
- Any combination among the two lines of the adapter up to 8 extenders

Physical location will effect the amount of equipment needed and its layout. For example, if there are 4 beds in Unit A and 5 beds in Unit B a site may need two extenders (although there are fewer than 16 beds) due to physical separation of the units and the location of serial cable terminations.

SERIAL COMMUNICATION: EQUINOX EQUIPMENT

As stated before, the QS’s PMS process collects data from the fetal monitors via serial input. The Equinox ESP-16 is a 16 port terminal server which will allow data streams from 16 fetal monitors to be directed back to the PMS process via its 10/100BaseT Ethernet port. Multiple serial concentrators may be used as needed.

The cabling requirements for the serial side (between the Equinox and the fetal monitors) of the Equinox are the same as those listed above for the Digi concentrator–with the added capability of CAT5 cable usage. Though there is a difference in the pin-outs, the cable which needs to be pulled is the same. The Ethernet side of the Equinox box is a standard 10/100BaseT half-duplex connection. Once the Equinox is connected to the Ethernet, distance and data rate is limited only be the Ethernet infrastructure.

IP COMMUNICATION: LAN

This section will concentrate on Ethernet as it is our most commonly installed LAN type.

The first decision that will drive the remaining network equipment requirements is whether to install a 10Mb or 100Mb Ethernet network. Network performance is tied directly to the amount and availability of bandwidth (the amount of data that can be transmitted per unit of time). In short, more is better thus the 100Mb Ethernet is preferred. Today there is little cost difference between 10 and 100Mb components so the decision is not a difficult one.

Generally, all network components purchased are either 10Mb, or all are 100Mb, but there are exceptions. Nearly all network interface cards in the computers supplied by GE are auto-sensing and can connect at either speed. Other network components also have the ability to mix media speeds. For example, the Bay Networks BayStack 350 series switch can have up to twenty-four 10/100Mb auto-sensing ports which allow both 10 and 100Mb Ethernet clients to attach to it.

Hubs and switches are used to connect the various network cables together. Hubs listen on all ports and repeat any data that arrive on a given port as output on all other ports. Switches do the same except that they repeat the incoming data as output ONLY on the proper destination port, as shown in Figure 14. Thus switches allow more network traffic because their intelligent delivery of data confines much traffic to smaller segments, minimizing collisions. Much of the data heard by the switch will not be repeated at all because it will be sent out only from the same port where the destination machine is connected.

Figure 14: Hubs Versus Switches

Hub and switch requirements will also be driven by the number of purchased QS network connections as well as physical network layout. If a site has purchased a total of twelve Ethernet connections for the QS, a single 12-port hub may not be sufficient due to network cables being pulled to two separate wiring closets. In this instance two hubs would be required.

Also, it is possible to join more network connections than the number of ports in the largest hub. The quote template includes stackable hubs that may be combined to form one large virtual hub when many network connections run to a single central location. This can be done with UTP cable but most hubs have fiber optic ports to allow such hub-to-hub connections.

While this may be sufficient for small installations, large numbers of machines in a single logical hub can create excessive collisions. For this reason it often makes sense to link hubs from different areas to the server's central location by connecting them to a switch. As with hub-to-hub connections, this can typically be done using fiber optic or UTP cable. The switch can then simultaneously compartment the various segments' traffic while allowing all to reach to the server. Other reasons for using a switch are:

- Ethernet clients terminating to one of several wiring closets (e.g. multiple units):
- A mix of media (i.e. UTP and fiber)
- Customer desired network performance
- Switching used to isolate the QS when utilizing a house network

The currently preferred switch has space for 4 media adapters. The available adapters are 2-port 100Mb UTP, 2-port 100Mb fiber, 4-port 10Mb fiber and an 8-port 10Mb UTP and an expansion module allowing connection to another switch. These modules may be installed in any combination. Each connection to the switch will require a port of the appropriate speed and medium type. The server(s) may plug directly into the switch in lieu of an additional hub.

Cable Specifications

Cable requirements for commonly employed LAN configurations are provided as follows:

Ethernet cabling specifications and limitations:

- Plenum rated CAT5 unshielded twisted pair (UTP) 4-pair, 24 AWG
- 330' from component to component

Fiber specifications and limitations:

- Multimode 62.5µm/125µm, duplex configuration
- 1.2 miles distance limit

IP COMMUNICATION: WAN ISSUES

The previous topics are applicable to the QS network being installed in a single site. There are additional considerations when implementing a QS network at several, physically separate sites. These instances are referred to as wide area network (WAN) implementations.

A WAN is generally considered to be a network that covers a wide geographical area and operates at speeds generally lower than those of a local area network (LAN). The QS has been successfully implemented over a number of connection types, including ISDN, T1, T3, ATM, etc. GE has no preference with regard to WAN connection type, but we do have some general guidelines concerning number of workstations per connection type.

- ISDN should be utilized for single workstation connectivity.
- T1 may be utilized for up to 10 workstations.
- Any remote site with greater than 10 workstations should be connected using T3, ATM, or some other high-speed WAN connection.

The factors that determined these general rules are discussed further in the Network Traffic Statistics section of this guide.

With any WAN implementation, the customer is responsible for installation, configuration and support of supplied WAN components ensuring end-to-end connectivity. GE does not have the technical support resources, knowledge base, or tools to provide support of this nature.

GE will work with the customer to select WAN hardware and software that meets the requirements of the QS network as part of network-related Project Management consultation.

IP COMMUNICATION: NETWORK TRAFFIC

On average, the QS software places a 5-15% load on a local 10Mb Ethernet network. During the running of certain processes such as printing, PtD jobs (patient data export and archiving), chalkboard verification functions, and fetal data review of high risk patients (long-term monitored patients), the network can experience bursts of 40-60%.

A T1 line speed is 1.544 Mbps (about $1/6^{th}$ the speed of Ethernet). When using the QS across a wide area network, the average bandwidth utilization of the software can exceed the entire capacity of a T1 line**.** Consequently, if a hospital has more than 10 workstations connecting to the server over a WAN, a single T1 line is not sufficient.

Several alternatives are available. If possible, connection via fiber is the most efficient. If a fiber solution is not viable, options include multiple T1 lines (1 line per 10 workstations) and a load balancing router (a router that bonds T1 lines together and switches from one line to the next when the a T1 line reaches capacity), or other high speed networks such as T3, ATM or frame relay.

The figures above are estimates. Recommendations are based on the assumption that the QS system is isolated from the house network and/or is running on a dedicated T1 line(s).

DIALUP ACCESS TO THE QS

The QS requires dialup access allowing GE to service, troubleshoot, and maintain the system. Access is accomplished using a remote access service (RAS) dialup connection. The main use of this connection is for system upgrades and system support calls.

System upgrades occur anywhere between two and six times a year including major and minor releases as well as patches. The connection is used to download the new software, application files, and/or tools releases to the server upon which it is distributed to the clients automatically.

System support calls are the result of the site contacting GE technical support with any manner of system problem. Technical support will utilize the dialup connection to troubleshoot, diagnose, and repair system errors.

While the majority of our customers have the support modem active at all times, there have been occasions when, due to security concerns, we have been asked to use alternative methods for access. The most common method of introducing additional security is having the modem powered off and requiring the technical support engineer to call a 24-hour hospital help desk for modem activation. There are other methods which are acceptable but it is important that the technical support department is contacted as to verify the technical aspects as well as the non-business hours feasibility.

THE QS AND THE HOSPITAL NETWORK ENVIRONMENT

Because of the amount of broadcast data associated with the patient monitoring functionality of the QS, and the need for available bandwidth to transmit critical patient information, it is **highly** recommended that the QS network segment is physically or virtually isolated from any existing hospital “house” network. Segmentation also aids in troubleshooting and problem isolation for both the QS and the house network. Having the networks isolated eliminates one potential source of error for both GE Technical Support and a hospitals IS staff.

There are three methods of network isolation most commonly used with QS implementations. Physical segmentation has new, dedicated cable installed for exclusive use of the QS. This is the most common and easy to implement manner of isolation. A router may be installed to isolate the QS segment from the house network. Finally, in a switched environment, the QS may be placed on its own VLAN.

INTERFACES

The QS is capable of receiving data from HL7 compliant hospital information systems (HIS) lab, and pharmacy systems. There are two ways the connection between systems can be made.

The first, and most common, is a TCP/IP network connection. Basically, a router is placed between the QS network segment and the hospital network and a route is established allowing the traffic to pass to the QS server. The router is required for network isolation which will be covered further.

The second connection method is a serial connection. In this method, a serial connection is run directly to a COM port on the machine running the data acquisition process.

There are several QS processes that are related to the implementation of an interface to a HIS. The HISS process is started on typically a QS server or load sharing server. This process accepts and stores data from the ADT and/or Lab systems. LAS (Lab Access Server) is the QS process that supplies ADT information and Lab data to Solar monitors. PMS is the process that acquires physiological data from various sources and an acquire task is needed to gather HIS or LAS data.

UNITY ISSUES

The GE Medical Systems Unity network is a link for efficient sharing of clinical information between cardiology, patient monitoring (non-fetal or maternal/fetal), hospital information and laboratory equipment.

A second network interface card is installed into the QS machine (and its backup, if one exists) which gathers patient data. This card is assigned an IP address in the Unity network range as supplied by GE Medical Systems. This card is then connected to one of the Unity (real time network) hubs. Information is then made available to the QS from GE Medical Systems monitors as well as non-GE Medical Systems bedside devices connected to the network. Non-GE Medical Systems devices are connected using *Octanet*, *Octacomm* or *Unity Network Interface Device* solutions.

Interface Devices

The *Octacomm* and *Unity Network ID* devices are self-contained, network-able, multi-port data interface devices that have the ability to interface external, standalone, patient-connected devices to the GE Medical Systems Unity network.

Octanet

Essentially, the QS will interface to the Octanet in the same manner as an Octacomm or Unity Network ID device. The difference is the Octanet interfaces peripheral bedside devices *through* a Solar monitor as compared to the interface devices that are connected to the same network as the adult monitors. When interfacing to Octanet, the QS will receive what the adult monitor transmits, which is not necessarily all parameters which the peripheral bedside device is transmitting.

The type of bedside peripheral devices include, but are not limited to, ventilators, IV pumps, NBP, SpO2, urimeters, other manufacturer's monitors, or any device that produces RS-232 serial output. Device ID Cable Adapters (DIDCA) are used to interface and identify various devices to the Unity Network ID, Octacomm, and Octanet.

NT ISSUES

- ### User Accounts and Security

  The QS uses two accounts for system functionality: QS and QSuser. The QS account is a member of the Administrative group on the local machine and is used for support purposes. The QSUser account is a member of the Users group and has no special privileges. By default, the system will automatically login the QSUser account and start the QS application. This behavior can be changed so as not to automatically login and not to auto-start the QS application if the site wishes to implement workstations differently.

- ### Workgroup versus Domain

  The standard QS system uses the workgroup model. If a site wishes to integrate the QS workstations into an existing domain, the site may do so after the system is installed. The site will be responsible for managing the domain and must maintain the Domain Controller/Backup Domain controller on servers other than the QS system servers.

- ### 3rd Party Applications

  3rd party applications may be installed on the QS clients. The installation and support of these applications is the sole responsibility of the hospital staff. GE will not provide technical support for installation and/or use of such applications.

- **Static IP Addresses and DHCP**

  While the QS can be implemented in a network that utilizes DHCP, the IP addresses assigned to the QS workstations need to be static. The QS workstations are identified within the application by their IP address.

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Chapter 4

Software Considerations

OVERVIEW

Events such as workstation replacement or repair will make it necessary for support personnel to either install or upgrade the QS configuration on one or more client workstations. The following paragraphs describe both of these processes.

This chapter also lists the minimum requirements for upgrading to QS Version 6.60.0.

Please note that changing server configurations, workstation names, etc. or other integral parameters of the QS (as installed at your site) is a serious undertaking. Generally, tasks of this nature should not be attempted without discussion with either a member of your facility's IT staff or a QS Customer Support representative.

SOFTWARE INSTALLATION

The install program contained on the **QS® Client CD** (part number 2008342-002) provides a quick and efficient method of performing the following QS client workstation configuration tasks:

- Verification of all inputs
- Creation of necessary directory structure
- Placement of tools files into their proper location on the target machine
- Creation of QS accounts - **QS**, **QSUSER** (if needed)
- Creation of **Start** menu items
- Addition of registry entries to support the QS
- Addition of the Time Service
- Addition of the **WINVNC** server
- Establishment of autologon parameters

Prerequisites

Requirements for QS 6.60.0 client workstations, server workstations and network configurations are provided by Table 6, Table 7, and Table 8, respectively.

Table 6: Client Workstation Requirements

CATEGORY	REQUIREMENT
General Requirements	• Must be capable of operating with Microsoft Windows NT 4 or Microsoft Windows 2000 Professional • Must be capable of running Quantitative Sentinel (QS) Version 6.60.0 • Must be capable of operating on a TCP/IP-based network - network requirements are provided in Table 8 • Operating System partition must be 1 GByte or greater • Space allocated for QS configuration and data storage must be 4 GBytes or greater • Video system (monitor) must support a resolution of 1024x 768 dpi and be capable of displaying 16 bit colors • Taskbar property **Always on Top** must be disabled
Additional Requirements for Perinatal Installations	• Must be capable of emitting audible alert tones • Must not shutdown the patient data display (i.e. the power-save mode must be capable of being disabled) • Must support use of Internet Explorer Version 6.0 or later • Must support use of Adobe Acrobat Version 4.0 or later
Required Components for NEW (QS6.60.0) Installations	• Intel Pentium III (or compatible) Microprocessor operating at 1.0 GHertz or greater • Microsoft Windows 2000 Professional with Service Pack 3 or Microsoft Windows NT 4 with Service Pack 6 • 256 MBytes of RAM or greater • 4.0 GByte Storage Subsystem or greater • 17 inch (or greater) Display Monitor with a refresh rate of 72 Hertz • Keyboard • Windows-compatible Mouse or Trackball • CD-ROM Drive
Required Components for Sites Upgrading to QS6.60.0	• Intel Pentium III (or compatible) Microprocessor operating at 400 MHertz or greater • Microsoft Windows 2000 Professional with Service Pack 2 or 3, or Microsoft Windows NT 4 with either Service Pack 4 or 6 • 96 MBytes of RAM or greater • 2.0 GByte Storage Subsystem or greater • 15 inch (or greater) Display Monitor with a refresh rate of 60 Hertz or greater • Keyboard • Windows-compatible Mouse or Trackball • CD-ROM Drive
Additional Considerations	• All hardware should appear on the Microsoft Compatibility List appropriate for the installed operating system.

Table 7: Server Workstation Requirements

CATEGORY	REQUIREMENT
General Requirements	• Must be capable of operating with Microsoft Windows NT 4 or Microsoft Windows 2000 Server • Must be capable of running Quantitative Sentinel (QS) Version 6.60.0 • Must be capable of operating on a TCP/IP-based network - network requirements are provided in Table 8 • Operating System partition must be 2 GByte or greater • QS configuration and data storage partition must be 4 GBytes or greater
Required Components for NEW (QS6.60.0) Installations	• Intel Pentium III (or compatible) Microprocessor operating at 1.0 GHertz or greater • 768 MBytes of RAM or greater • 18 GByte RAID-5 Storage Subsystem or greater with either a hot-spare or backup drive • Windows-compatible pointing device (mouse or trackball) • 1024x768 Display Monitor capable of 256 colors or greater • Uninterruptible power supply or battery backup • Keyboard • CD-ROM Drive • 3.5 inch floppy drive • Clustered-server configuration or warm backup server
Required Components for Sites Upgrading to QS6.60.0	• Intel Pentium III (or compatible) Microprocessor operating at 500 MHertz or greater • 384 MBytes of RAM or greater • 9.0 GByte SCSI Storage Subsystem (RAID-5 or Monolithic)** • Windows-compatible pointing device (mouse or trackball) • 1024x768 Display Monitor capable of 256 colors or greater • Uninterruptible power supply or battery backup • Keyboard • CD-ROM Drive • 3.5 inch floppy drive
Additional Considerations	• All hardware should appear on the Microsoft Compatibility List appropriate for the installed operating system.

** On NT4 QS Servers with C:; D:; E:; F:; and G: drives, the QS drive (D:) used for configuration information must have a storage capacity of 1 GByte or greater.

The QS requires a functional and reliable network system. Customers are responsible for providing and maintaining the network operation and performance characteristics at an acceptable level (see Table 8).

Table 8: Network Requirements

CATEGORY	REQUIREMENT
General Requirements	• Must be capable of transmitting and receiving TCP/IP messages between clients and servers • Cable length must conform to network hardware manufacturer's specifications • Wireless transmission distance must conform to network hardware manufacturer's specifications
Hardware Components	• Network components must conform to IEEE-802 standards • Components installed in client and server workstations must be supported by Microsoft - appear in the Hardware Compatibility List available on the Microsoft web site - **http://www.microsoft.com/hcl**
Workstations	• Client to server communications must ensure TCP/IP communication with low latency times (<10 millisecond average) and sufficient bandwidth (average utilization < 20%) • Server components must be capable of transmitting at 100 MBps or greater • Client components must be capable of transmitting at 10 MBps or greater
Network Drawings	• Detailed network drawings (reflecting the as built configuration) must be made available to GEMS IT

Server WorkstationTable 9 summarizes QS Tools applicability to specific QS versions and the specific CDs upon which each version of QS Tools may be found.

Table 9: Tools Version Applicability

CD-ROM	Revision	Tools Version	QS Version	Status
2008342-002	A	1.04	5.06.1	Active
2008342-002	B	1.05	6.00.0	Obsolete
2008342-002	C	1.05	6.00.0	Active

Assumptions

The **Installqs** program assumes that the **Primary QS server** is named **QSSERVER** and that it is reachable using **TCP/IP**. If the server name is not QSSERVER, then the variable **QSUPDATE** must be changed on every client to the name of the server that has the QS files for downloading. If the client cannot reach the server because it is in another IP domain, then the **LMHOSTS** and **Hosts** files must be modified to point to the correct TCP/IP address for the Primary QS Server.

Information on changing environmental variables and modifying the LMHosts and Hosts files may be found in the Windows documentation provided by Microsoft.

Installation Procedure

To complete the client workstation software installation process, perform the following steps.

1. Insert the QS Client CD into the CD-ROM drive of the workstation being configured.
2. Access a command prompt and change the directory to match that of the CD-ROM drive.
3. Start the automated installation process using the following command structure.

   Installqs D: Y QSUSER

   The command shown above reflects the use of normal parameters. Each parameter is separated from the others by a single-space. Each command element may be modified in accordance with the information in Table 10.

Table 10: Installation Command Parameters

Parameter	*Description*
Target Drive (***D***: in the example)	This paragraph designates the drive to which the QS software will be copied (loaded). The acceptable range of inputs is from ***C:*** to ***Z:***. This component MUST consist of a drive letter and a colon - example ***C:***, ***D:***, ***E:***, etc.
Local Accounts (***Y*** - normal selection)	Acceptable inputs are either ***Y*** or ***N***. • Enter ***Y*** (yes) if accounts are to be created on this client workstation. • Enter ***N*** (no) if this workstation will be part of a domain structure where there is no need for accounts on this workstation.
Autologon / Autostart (***QSUSER*** - normal selection)	Acceptable inputs are ***QSUSER***, ***ALL***, and ***NONE***. • ***QSUSER*** will autologon to the system at boot-time and start QPM. • ***ALL*** will not autologon at boot-time, but will start QPM for any user who logs into the workstation. • ***NONE*** will not autologon to the workstation at boot-time and will not start QPM for users who log into the workstation.

4. After the installation (configuration) process has been completed, remove the **QS Client CD** from the workstation drive.
5. Close the **Command Prompt** window.

NOTE

QSUSER is automatically added to the **Power Users** group as part of the installation process. If the workstation is configured with Windows 2000, proceed directly to step 7. If the workstation is configured with Windows NT then Step 6 needs to be performed.

6. If the workstation is configured with the Windows NT operating system, you must remove **QSUSER** from the Power Users group through the use of the **Administrative Tools > User Manager** capability.
7. Click the **<RMB>** over an unoccupied area of the displayed desktop and select the **Properties** menu option.

8. Select the **Settings** tab and make sure that the following options are set as indicated:
   - **Desktop Area** - set for a resolution of 1024 x 768
   - **Color Palette** - 65536 Colors (16 bit)
9. Reboot the client workstation.

NOTE

The **<RMB>** refers to the right mouse button for a pointing device configured for right-handed users generally used to access menu options.

10. Click the **<RMB>** over the task bar and select the Properties menu option and make sure that the following options are set as indicated:
    - **Auto hide** enabled (check mark visible)
    - **Always on top** disabled (no check mark)
11. Acknowledge all messages (including the welcome message) during reboot.

NOTE

If the client workstation is configured with the Windows 2000 Professional operating system, you will need to perform step 12 to ensure that all of the fonts installed during start-up are activated.

12. After the **QPM** program is running, perform a manual system shutdown and then reboot the workstation.

SOFTWARE (VERSION) UPGRADES

The QS is periodically modified to correct operational anomalies and incorporate new feature sets in an attempt to best serve the needs of our customers. These modifications are automatically installed as part of a new installation; however, previously installed QS configurations will need to be upgraded in order for the features/capabilities of a particular QS release to be available.

Upgrade Process

Upgrades are provided free of charge to all customers either still under warranty or in possession of an active (unexpired) *software service agreement* (SSA). Customers that are neither under warranty nor in possession of a valid service agreement may still obtain upgrades; however they will need to initiate the process by contacting a QS sales representative.

Release Notes

The various features and fixes associated with a new QS upgrade are described in version specific *release notes* that are delivered by mail and/or email to primary customer contacts at each facility. These release notes are generally delivered once the associated QS release has become available.

Additional costs

Generally, there are no additional costs associated with a QS upgrade for customers possessing a valid warranty or SSA. However, should an upgrade require any of the following items/services, the associated costs will be the responsibility of the customer.

1. Procurement and installation of new hardware.
2. Training to address use of the new features.
3. Project management, corrective actions or services requiring a GE representative to travel to the customer facility.

Installation

The installation of a QS upgrade is generally performed remotely by GE personnel via a dedicated remote connection.

Personnel requirements

The normal upgrade process is performed almost entirely by a GE employee. However, a staff member at the facility being upgraded will be required to load the upgrade CD-R disc into the QS server workstation.

System down-time

The upgrade process involves suspension of QS system operations in order to perform system-cycling (rebooting) and other necessary procedures. Customers should be prepared for a period of disruption approaching eight (8) hours. Actual length of the disruption is determined by many factors such as the size and complexity of the installed QS configuration. Please be aware of the fact that GE Customer Support personnel will make every effort to minimize the duration of system non-availability.

Upgrading sites not under warranty (without a valid SSA)

Customers without either a warranty or valid SSA should contact a QS sales representative at the following number to obtain information about obtaining the desired QS upgrade.

QS Sales ..... **1-866-664-8677** option/extension **9**

Upgrading sites under warranty (with a valid SSA)

The process that these customers should use to obtain a QS upgrade is described as follows:

1. **Customer** initiates a call to QS Customer Support (see listing) to request an upgrade.
2. **QS Customer Support** verifies that the customer either has a valid service agreement or is still under warranty.
3. If in possession of a valid warranty or SSA - **QS Customer Support** logs the request into the call log and an *Upgrade Preparation Checklist* (see Table 11), which must be completed prior to scheduling of the upgrade, is faxed to the customer.
4. The **Customer** completes and returns the checklist to QS Customer Support.
5. **QS Customer Support** contacts the customer soon after the completed checklist is received and reviewed to schedule the upgrade.
6. **QS Customer Support** ships an upgrade CD-R disc to the customer.
7. **QS Customer Support** orders documentation appropriate for the requested upgrade and has it shipped to the customer.
8. **QS Customer Support** performs the upgrade on the previously scheduled date.

Upgrade Preparation Checklist

Table 11 exemplifies the upgrade preparation checklist normally provided by QS Customer Support.

NOTE

Please contact QS Customer Support should your facility desire to upgrade your current QS configuration. Do not use the example checklist that follows as its content may no longer be appropriate.

Table 11: Example Upgrade Preparation Checklist

COMPLETED (Yes or No)	STEP	COMMENTS
Contact Information		
	1. Do you have a GEMS-IT Software Services Agreement (SSA) signed?	***If No***, please contact your sales rep to sign the SSA before you are eligible for the upgrade
	2. Who are the Points of Contact for upgrade – including email, phone, pagers, and fax numbers: • System Manager • Clinical Perinatal Director • IS Director involved in this upgrade (if different from System Manager)	You should coordinate with each of them to ensure they are aware of upgrade & know what, if anything, is needed of them before or during the upgrade process
	3. Do you want CD upgrade information shipped prior to upgrade	If Yes, provide name and address if different than currently identified key contact
	4. Should Documentation Manuals to be shipped to same POC & Address as upgrade CD?	***If No***, provide name, address, phone, & email address
Readiness Assessment (OS/2 vs NT, Clients vs Servers, Domain Environment)		
	5. What is your current QS version?	If you are on version prior to 5.06, this upgrade may be a 2 step upgrade process if you are not purchasing new servers (see step #11 below)
	6. Is site using any OS/2 clients or servers for ANY processes below:	
	• Printing	1. ***If yes***, then you must convert all PLDs, Forms and Charts from OS/2 to NT in order to print; 2. Will you have this conversion completed prior to your scheduled upgrade? 3. What is the scheduled date for this conversion to occur _____
	• Archiving	1. ***If yes***, are you using WORM drives? 2. Have you ordered QS ACT services for converting platters to CD? 3. When do you plan to send your optical platters to GE
	• Faxing	***If yes***, then same process as Printing
	• Chalkboards	***If yes***, then same process as Printing

Table 11: Example Upgrade Preparation Checklist

COMPLETED (Yes or No)	STEP	COMMENTS
	• Spectra-Tel (Previous Version of Physician's Remote Access)	***If yes***, then hospital needs to purchase OB Link
	7. Are you using Old Style Fluids?	***If yes***, then you will ultimately need to convert to New Style fluids by reentering all data. **NOTE**: You can proceed with the overall upgrade without completing this segment; however, you will not be able to print any fluid information after upgrade conversion.
	8. If you are not sure about your OS/2 status, please take the steps outlined to the right and do not proceed with this Checklist until these steps are completed.	1. Test each of the processes noted above (step 6) after turning off your OS/2 server and clients. If all your processes above work satisfactorily, then you are ready for the upgrade. 2. Contact Customer Support to confirm as necessary.
	9. Per OS/2 questions above (step 8), if you have confirmed that you have no servers and/or clients running OS/2, then are your servers and clients on **NT Service Pack 4** or above?	***If no***, you need to make arrangements with your IT department to have NT Service Pack 4 or above. **NOTE**: GE strongly recommends Service Pack 6a.
	10. Do you have a Backup and Loadshare Server	Complete the **Server & Workstation Validation Checklist** for Steps 10 through 14 to ensure you have appropriate server and client workstation hardware configurations to support QS 6.xx.x.
	11. Are you ordering new servers?	***If yes***, then you do not need to contact Customer Support to schedule your upgrade. Our manufacturing operations will deliver your existing site tables with the upgrade incorporated.
	12. Do you have suffient RAM for each Server? See Table 7	***If no***, you need to upgrade the amount of RAM in all servers. **NOTE**: If the site purchases additional RAM from GE, then the QSIC or GE Service representative can install the RAM in the server. Otherwise, the site is responsible for installing the RAM.
	13. Are you ordering new client workstations?	If yes, then any new workstations provided by GE will come with Windows 2000 Professional loaded. **NOTE**: Windows 2000 workstations can coexist with Windows NT workstations on the same network. However, you will not be able to use the new workstations until their configuration is upgraded to QS 6.xx.x.
	14. Do you have suffient RAM for each client workstation? See Table 6.	***If no***, you need to upgrade the amount of RAM in ALL client workstations
	15. Is your site on a Domain?	If your QS system is running on the Hospital domain and you have made changes to the original QS setup, then your upgrade performance may be more complicated

Table 11: Example Upgrade Preparation Checklist

COMPLETED (Yes or No)	STEP	COMMENTS
Upgrade Process (OS/2 vs NT, Clients vs Servers, Domain vs Workgroup Environment)		
	16. Have you planned for your system to be unavailable?	You will need to make arrangements for manual backup processes and try not to schedule critical surgeries on the day of the upgrade. Installation time will vary depending on the complexity of the system configuration.
	17. Do you want your HIPAA license turned on with Security & Audit Trail reporting enabled during the upgrade?	***If no,*** then you must request this step from Customer Support at a later time.
	18. Do you want your HIPAA Audit Logging to the Security & Privacy Event Database enabled?	
	19. Have you evaluated the new QS 6.xx.x clinical content database with your sales representative or Inside Sales?	
	20. Are you aware that you will **NOT** be receiving the new clinical content database with the standard software upgrade performed by Customer Support?	If you select a **full system replacement** and maintain your current clinical database, then you will also not receive the new clinical database.
	21. GE Customer Support will pull PLD forms and charts for conversion from OS/2 to NT.	GE is responsible for this step if the hospital obtains GE customization services. The system will be “locked” for any changes at this time. If any system changes and/or new users are added, they will also need to be inserted into the new system.
	22. Have your PLD form and chart updates been completed?	
	23. **For printing** - Attach new NT PLD templates for forms and charts to the Designer Chart & Form view	
Other Considerations		
	24. Hospital agrees to perform testing and/or validation after upgrade, system replacement or clinical database replacement.	
	25. **Enabling Required Items** - Are you aware that you will need to build your own Required Item Rules and Rule Sets? Do you need to purchase GE customization services after the upgrade to complete this step?	Only the functionality exists via Designer to enable you to create your custom rules.
	26. **Enabling HIPAA PHI** - Are you aware that you will need to define your own "Protected Health Information" based on your hospital's definition of PHI? Do you need to purchase GE customization services after the upgrade to complete this step?	Only the functionality exists via Designer to enable you to identify and customize PHI at the item level and provide appropriate authority to select users for print & fax.

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Table 11: Example Upgrade Preparation Checklist

COMPLETED (Yes or No)	STEP	COMMENTS
	27. If you select clinical **Database replacement**, are you aware that **you will lose** any customization previously completed?	Additional customization services (for a fee) are available through the GE IT Professional Services team.
	28. Training for System Manager or End Users can be purchased from GE's IT Professional Services Group	Because of the availability of QS 6.xx.x documentation, we do not anticipate the necessity for any end user/site training.
	29. **ADT & Lab Interfaces** - what interfaces are present currently?	
	30. **Physiologic Monitor Interfaces** (fetal monitor, EKG, etc) - what interfaces are present currently (HP Careport)?	
	31. **Is your site running Token Ring**?	***If yes***, your hospital must convert to ethernet cabling as part of the conversion process.
	32. **Is your site purchasing new maternal/fetal monitors** as part of this conversion process?	***If yes***, then new cabling may be required.
	33. **Do you use CoroLan cabling**?	***If yes***, your hospital must have their Corolan networks replaced & rewired with the serial Equinox system as part of their OS/2 conversion to NT - regardless of which migration path they select. Corolan is no longer supported with the QS product since it requires an OS/2 workstation in order to operate.

Chapter 5

Preventive Maintenance

OVERVIEW

Preventive maintenance (**PM**) focuses upon the cleaning and periodic servicing of the 3rd party equipment that hosts and supports the operation of the QS. These tasks are repeated at specified intervals to ensure that each piece of equipment operates in the prescribed manner for the entirety of its anticipated life-cycle.

GE RECOMMENDATIONS

PM tasks are defined by the manufacturer of each piece of equipment (workstation CPU, monitor, etc.). You should familiarize yourself with each of the suggested PM tasks and ensure that they are scheduled for performance in accordance with manufacturer guidelines. You should also periodically perform the following tasks as a supplement to manufacturer recommendations.

NOTE

The following recommendations are intended to supplement those of the individual equipment manufacturers as well as the established policies of your facility. Please consult with your IS representative should you have any questions about the following guidelines.

1. Ensure that electrical cables do not exhibit any visual signs of damage - broken connectors (plugs), worn or damaged insulation, etc.
2. Ensure that all electrical connections are made to approved outlets (power sources).
3. Ensure that sufficient ventilation exists for all electrical equipment. Electrical (computer) equipment should not be located in enclosed spaces with restricted air-flow. Failure to comply with this recommendation could result in decreased performance, equipment failure, and the creation of a potential fire hazard.
4. Ensure that cooling vents and fan openings are not obstructed by debris build-up (dust, lint, etc.). Failure to comply with this recommendation could result in decreased performance, equipment failure, and the creation of a potential fire hazard.
5. Ensure that equipment is safely mounted on stable surfaces (fixtures). Improper stowage (physical instability) could result in personnel (patient) injury and/or equipment damage.
6. Ensure that QS equipment is included in the established cleaning/disinfecting programs in place at your facility.

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Chapter 6

Data BackUp

OVERVIEW

GE strongly recommends the use of a data backup system in conjunction with the QS. Without a backup mechanism in place, there exists the very real possibility that valuable information could be irretrievably lost. A data backup program should generally focus on safeguarding the patient database and the current system configuration.

SOURCE OF BACKUP TOOLS

GE has a backup tool designed to safeguard QS data at regularly scheduled intervals. You can make use of the GE backup tool, purchase an alternative solution from another software provider, or use a mechanism that may already be in place at your facility for archiving data.

You are encouraged to contact QS Technical Support for assistance in setting up the QS backup tool.

RESPONSIBILITY

Selection of a backup tool, development of a backup plan, determination of appropriate criteria (what to backup, how often, etc.), etc. is the responsibility of the customer.

IMPORTANT CONSIDERATIONS

GE views data backup as a *critical daily function*; however, each facility must determine the scheduling that best meets its needs.

Equally as important is the protection of the media (CD, tape, etc.) containing the backup data. Some users take the additional precaution of making duplicate copies of all media and maintaining a second data archive in a different geographical location.

The following items should receive consideration when your site develops/modifies its backup plan.

1. The operating system (generally installed on drive **C:**) before any alterations are made to its installation/content.
2. QS system files and patient data on drive **D:** on Windows 2000 systems.
   The content of **E:** on older NT systems.

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Appendix A

Glossary - Network Terms

100BaseFX – 100Mbps Ethernet (Fast Ethernet) running on multimedia fiber media.

100BaseTX – 100Mbps Ethernet (Fast Ethernet) running on CAT5 UTP media.

10BaseFL – 10Mbps Ethernet running on multi-mode fiber media.

10BaseT – 10Mbps Ethernet running on CAT5 UTP media.

Asynchronous Transfer Mode (ATM) – A high-speed transmission protocol where data blocks are broken into small cells which are transmitted individually and possibly via different routes.

Attenuation – A weakening of a signal as a result of distance and characteristics of the medium.

Backbone – Connects two or more networks.

Bandwidth – A measure of the amount of data that can be transmitted over a period of time.

Bits-Per-Second (bps) – The number of bits that can be transmitted over a medium in one second. A measure of data transmission speed.

Bridge – An interface used to connect networks using similar data link protocols.

Broadcast – A message sent to all users on a network.

Carrier Sense with Multiple Access and Collision Detection (CSMA/CD) – The media access control technique used by Ethernet that attempts to detect collisions.

Category 5 (CAT5) Unshielded Twisted Pair (UTP) Cable – Copper-based cable used for network infrastructure. Required for Fast Ethernet.

Client – A software application that requests services from the server in a client/server computing environment.

Client/Server – An application framework in which the processing load is divided among several processes call clients and servers. Clients issue requests to servers which provide specialized services such as database processing. When clients and servers are located in different computers, application processing is distributed over multiple computers and, in effect, the network becomes the computer.

Collision – Occurs when two stations attempt to send data at the same time. The data interferes with each other and re-transmission is necessary.

Dedicated Server – One or more computers that operate only as a designated file, database, or other type of server.

Ethernet – A local area network implementation using the CSMA/CD protocol. The IEEE 802.3 is based on Ethernet and is one of the more popular local area network implementations. Data is transmitted at 10Mbps.

Fast Ethernet – A local area network implementation nearly identical to Ethernet but running at 100Mbps.

Fiber Distributed Data Interface (FDDI) – An ANSI LAN standard for fiber optic LANs spanning a distance of approximately 200km (120mi.) and providing speeds of 100Mbps.

Fiber Optic Cable – A transmission medium that provides high data rates and low errors. Plastic or glass fibers are woven together to form the core of the cable. This core is surrounded by a plastic or glass layer called the cladding. The cladding in turn is covered by a protective plastic covering.

File Server – A computer that allows other computers on a network to share resources such as data, programs, and printers.

Fractional T1 – A T1 service that fills the void of high speed options between 64Kbps and 1.5Mbps by providing a portion of a T1 line to a customer.

Full Duplex – A data transmission mode in which data is transmitted over a link in both directions simultaneously.

Gateway – The interface used to connect two dissimilar networks or systems by providing conversion from one network to another.

Half Duplex – A data transmission mode in which data can travel in both directions over a link but in only one direction at a time.

House Network – An existing, corporate-use network.

Hub – The connection point of all clients and servers. A piece of network equipment used in virtually all networks.

Integrated Services Digital Network (ISDN) – The integration of voice and data transmission (and other formats such as video and graphics images) over a digital transmission network. Combination of two B channels allows for data transmissions of up to 128Kbps.

Local Area Network (LAN) – A communications network in which all the components are located within several kilometers of each other and that uses high transmission speeds.

Media Access Control (MAC) protocol – A sub layer of the OSI reference model's data link layer. The MAC protocol defines how a station gains access to the media for data transmission. Ethernet's MAC is CSMA/CD.

Medium – In data communications, the carrier of data signals. Twisted pair wires, coaxial cables, and fiber optic cables are the most common LAN media.

Multi-mode Fiber – Fiber optic cable which can accept several wavelengths of light as its source of propagation.

Network Topology – A model for the way in which network nodes are connected. Network topologies include star, ring, and bus.

Redundant Arrays of Inexpensive Drives (RAID) – A fault-tolerant disk storage technique that spreads one file plus the file's checksum information over several disk drives. If any single disk drive fails, the data stored on it can be reconstructed from data stored on the remaining drives.

Router – A network interconnection device and associated software that links two networks. The networks being linked can be different, but they must use a common routing protocol.

Switch – Network component designed to increase network performance by facilitating LAN segmentation.

Synchronous Optical Network (SONET) – An optical-based network which standardizes transmission speeds and encoding, allowing multiple transmission formats to be sent on one line at a rate of 51.85Mbps.

T1 – A leased digital transmission link with a bandwidth of 1.544Mbps

T2 – A leased digital transmission link with a bandwidth of 6.312Mbps

T3 – A leased digital transmission link with a bandwidth of 44.736Mbps

T4 – A leased digital transmission link with a bandwidth of 274.176Mbps

Token Ring – A network type based upon a token passing media access control protocol. A "token" is passed amongst the network nodes. When a computer which has data to transmit receives the token, it may transmit that data. Upon transmission, the token is passed to the next node in the ring.

Transceiver- A device containing transmit and receive electronics which allows connection of differing transmission media (10Base2 and AUI, etc.).

Transmission Control Protocol/Internet Protocol (TCP/IP) – A suite of internetwork protocols developed by the U.S. Department of Defense for internetwork file transfers, electronic mail transfer, remote logons, and terminal services.

Uninterruptible Power Supply (UPS) – A backup power unit that continues to provide power to a computer system during the failure of the normal power supply. A UPS is frequently used to protect LAN servers from power failures.

Virtual LAN (VLAN) – Logically grouped network elements. VLANs are a successful way of modifying the amount of traffic in any given sub-net.

Wide Area Network (WAN) – A network that typically covers a wide geographical area and operates at speeds generally lower than those of a LAN.

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Appendix B

Sample Network Diagrams

OVERVIEW

The following pages illustrate a variety of possible QS network configurations. Note that this collection of diagrams represents but a small number of the network configurations that are possible in the QS. If you have questions about what constitutes the best configuration for a specific situation, please contact your GE Customer Support representative.

LIST OF DIAGRAMS

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Figure B-2: Intensive Care Configuration - Single Unit B-3
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Figure B-6: Surveillance Configuration - Wide Area Network (WAN) B-7
Figure B-7: Surveillance Configuration (WAN) - Primary & Remote Sites B-8
Figure B-8: Surveillance Configuration WAN-Ring B-9

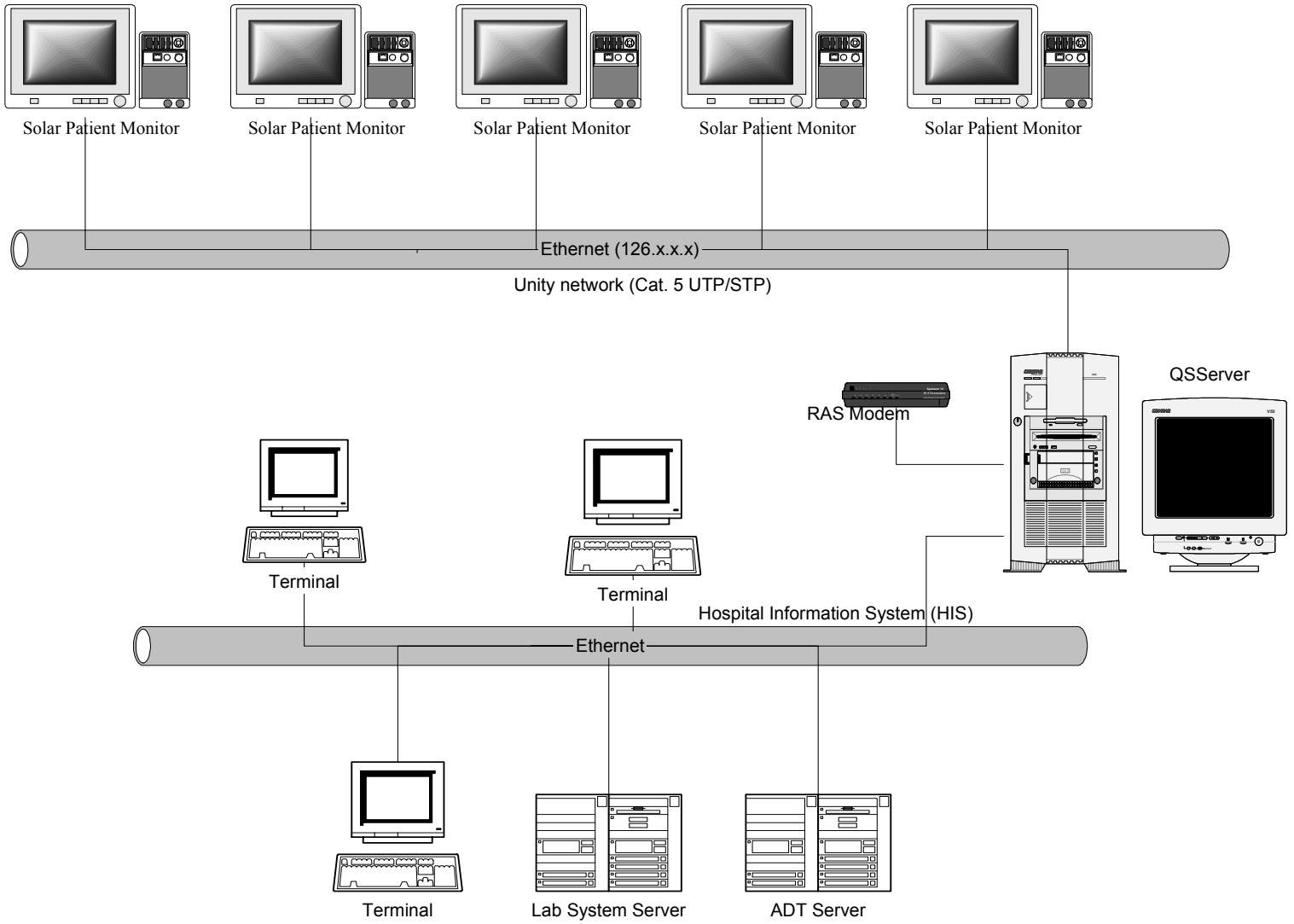

Figure B-1. HL7 Solar Lab Access Configuration

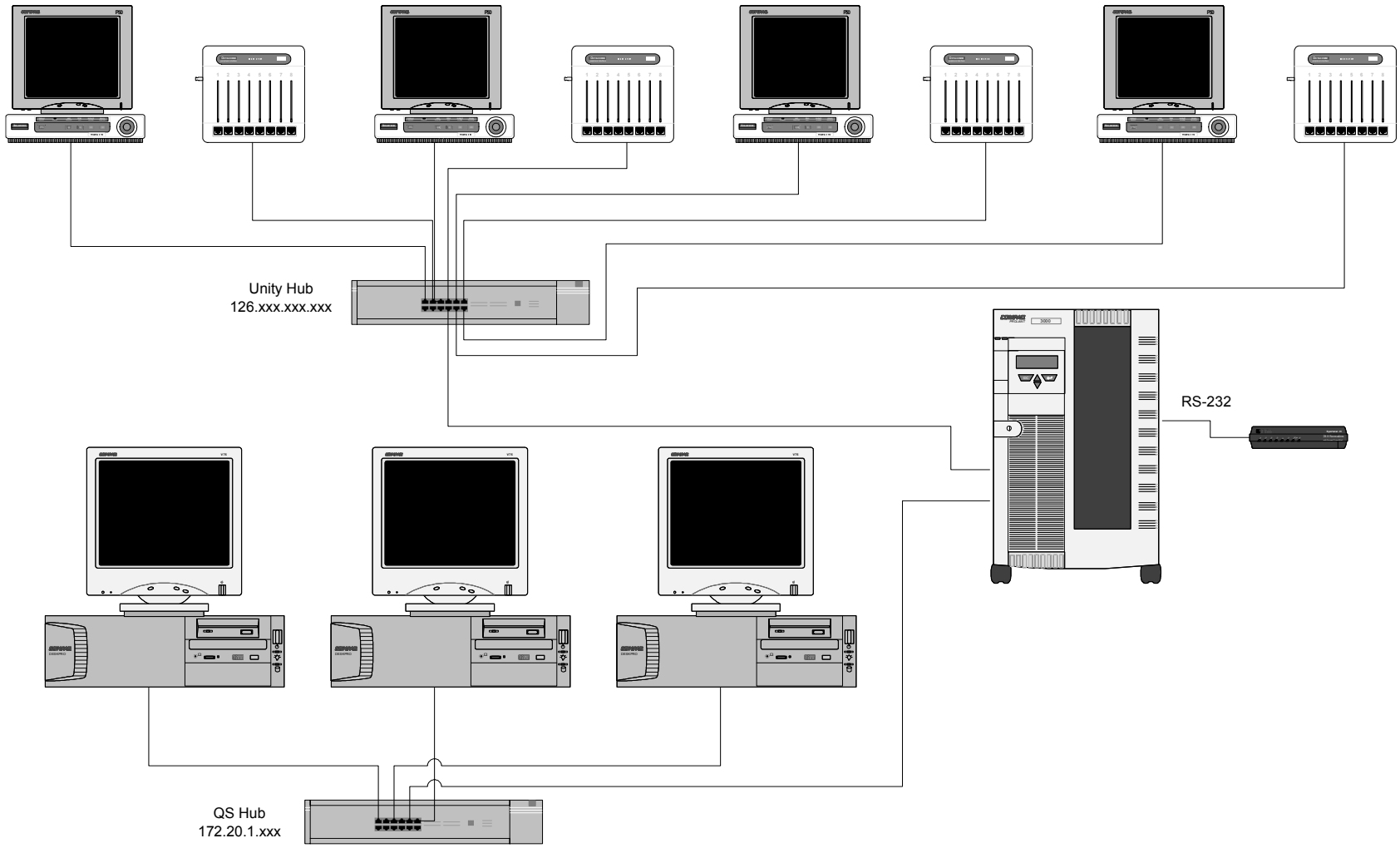

Figure B-2. Intensive Care Configuration - Single Unit

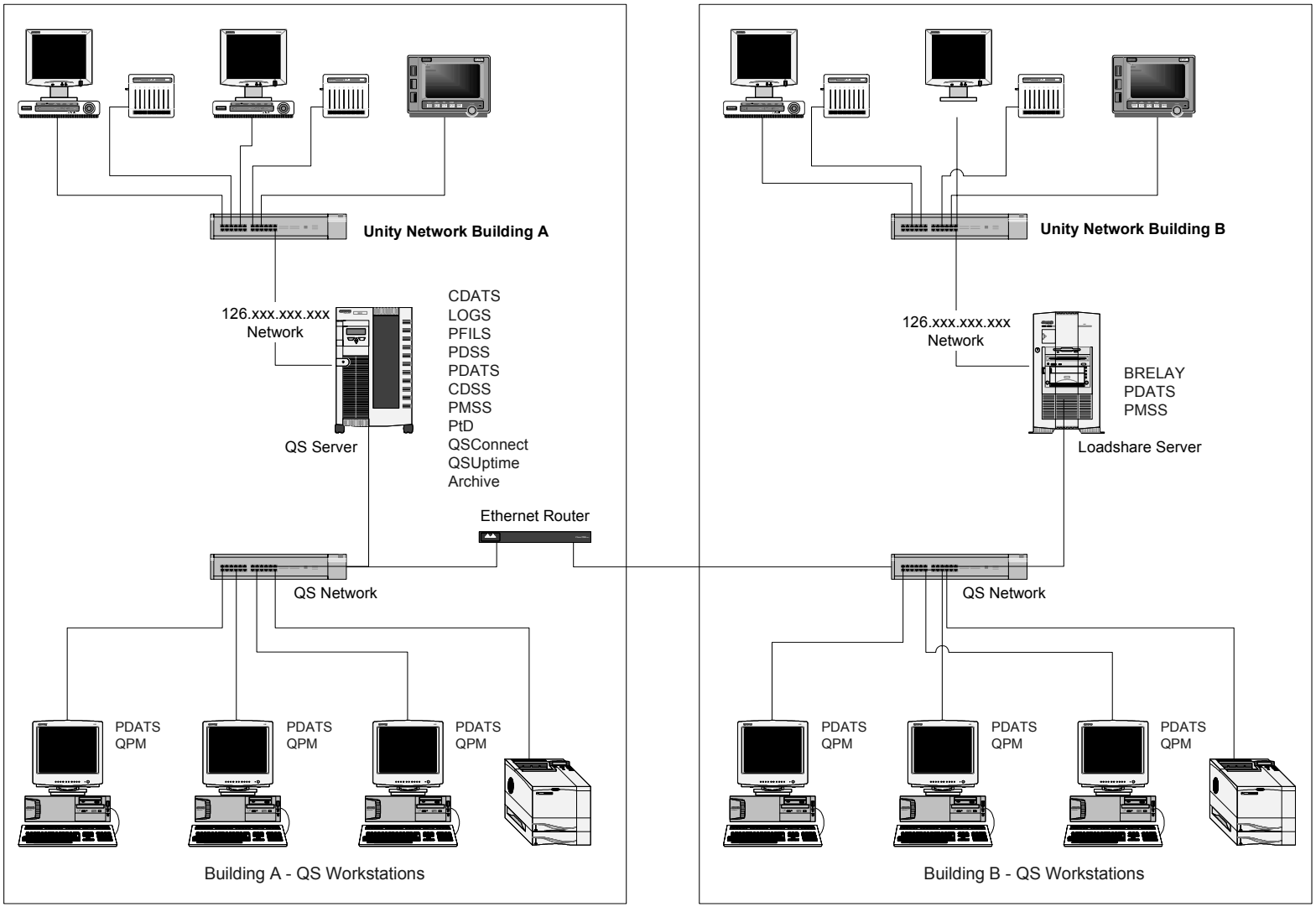

Figure B-3. Intensive Care Configuration - Multiple Units

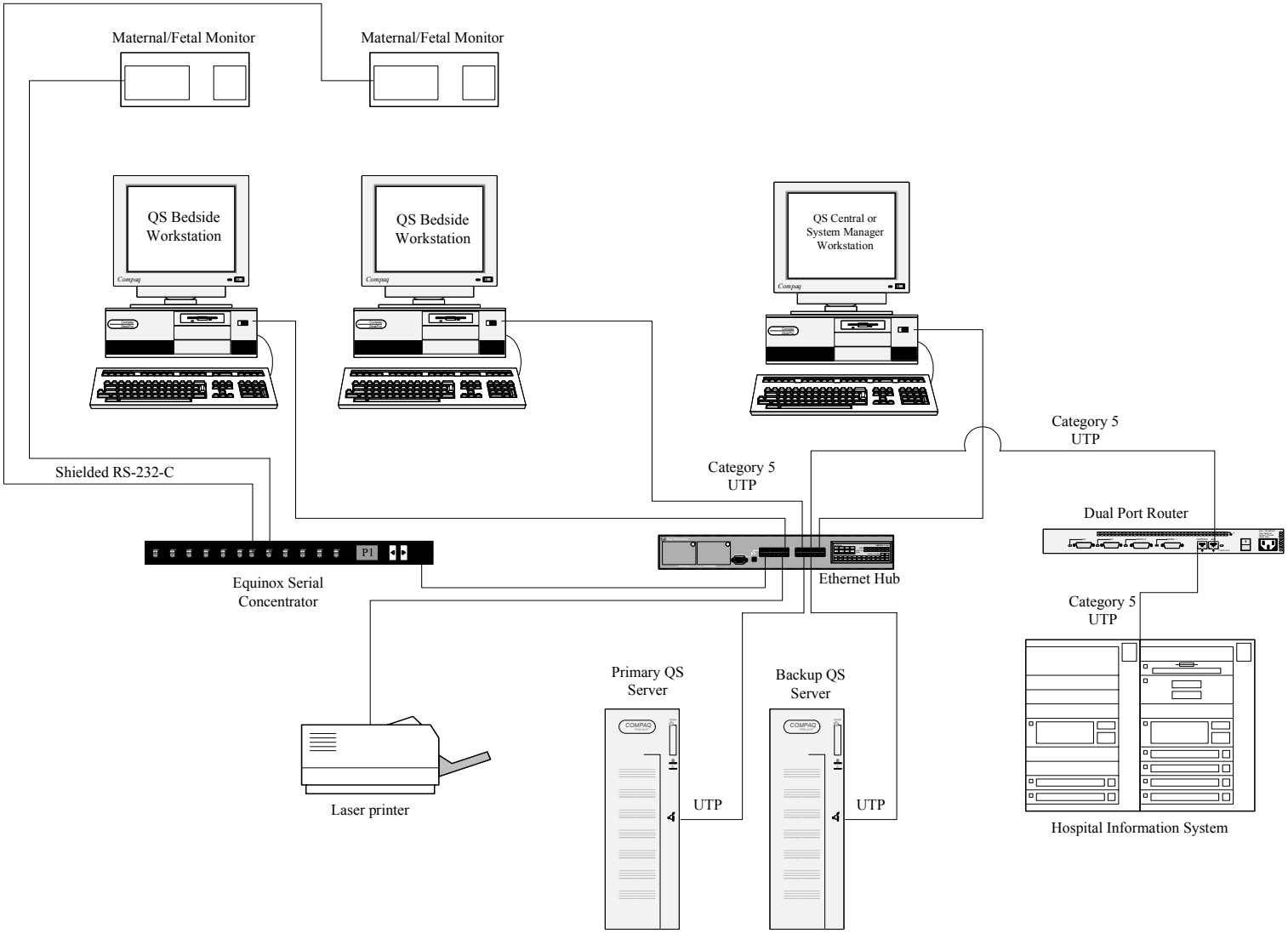

Figure B-4. Surveillance Configuration - Single Unit

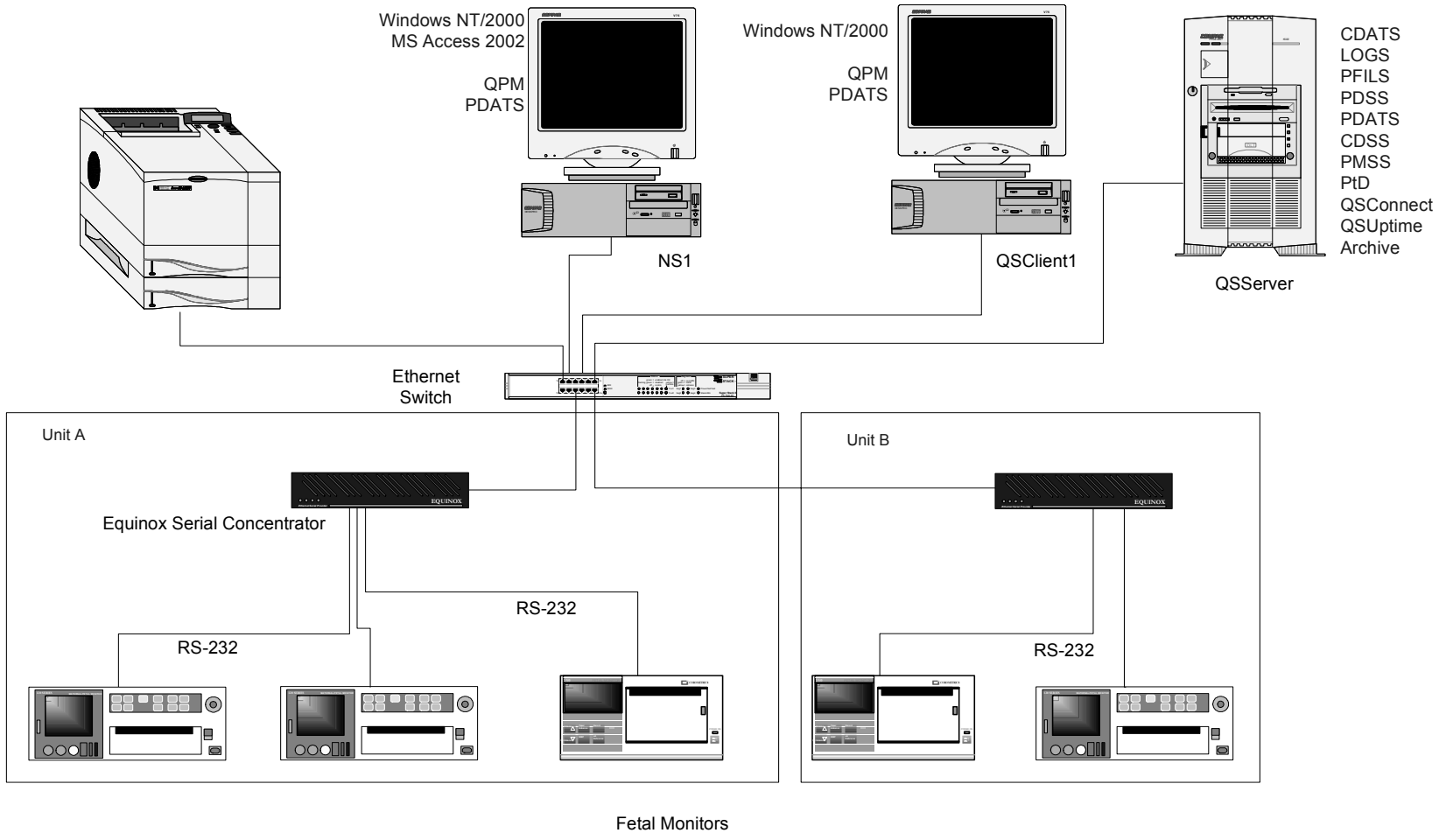

Figure B-5. Surveillance Configuration with Equinox Concentrator - Multiple Units

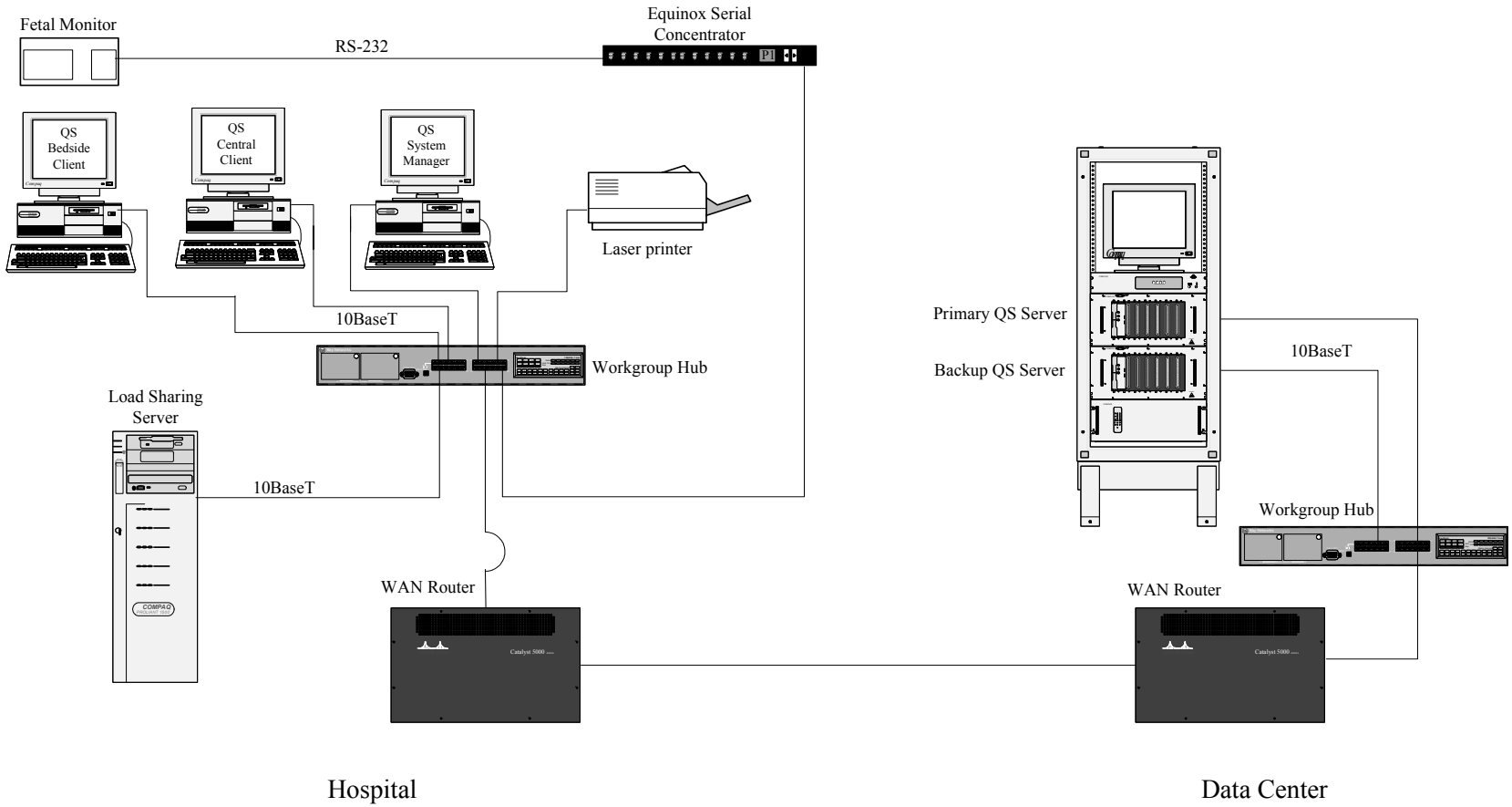

Figure B-6. Surveillance Configuration - Wide Area Network (WAN)

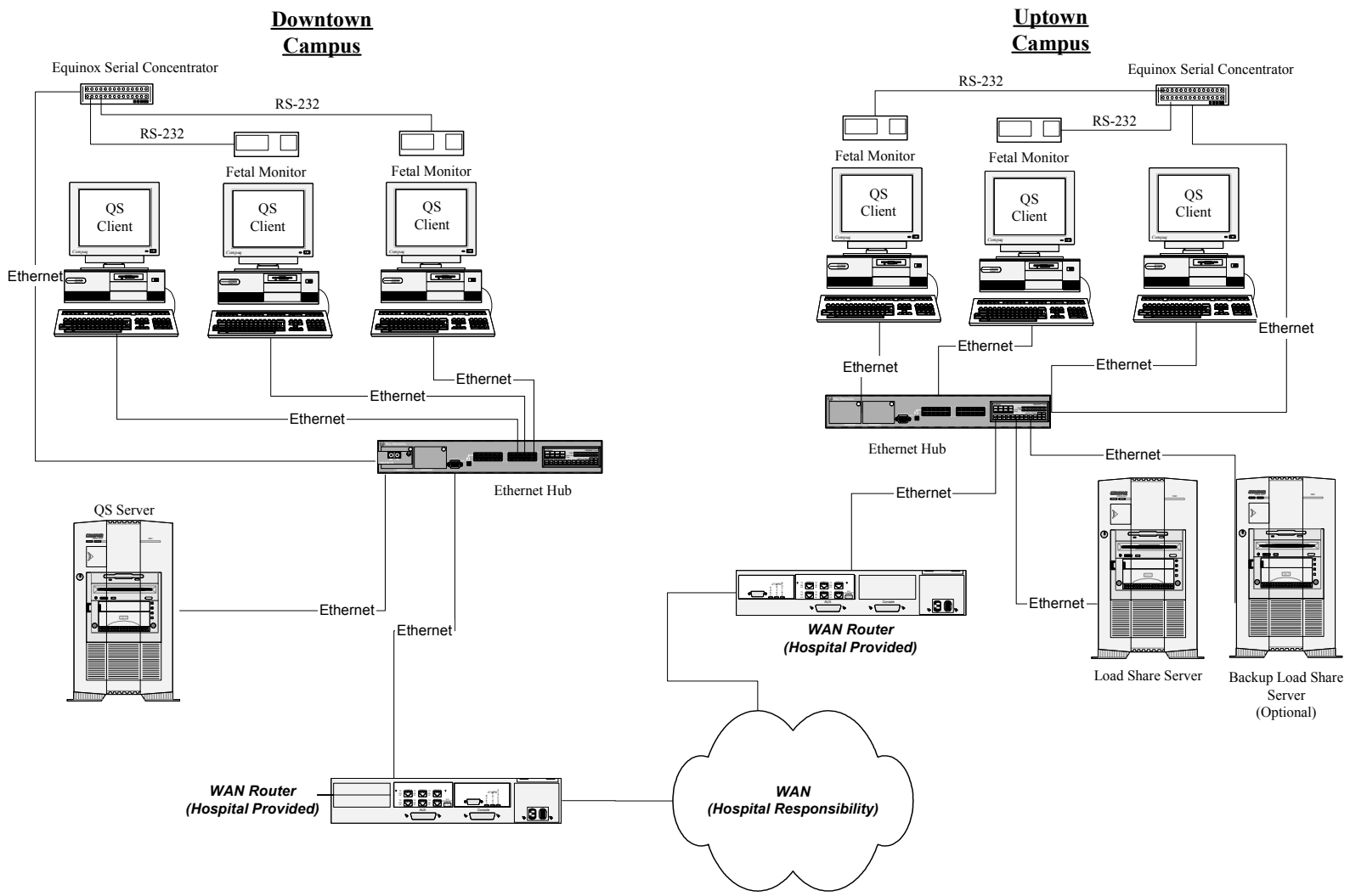

Figure B-7. Surveillance Configuration (WAN) - Primary & Remote Sites

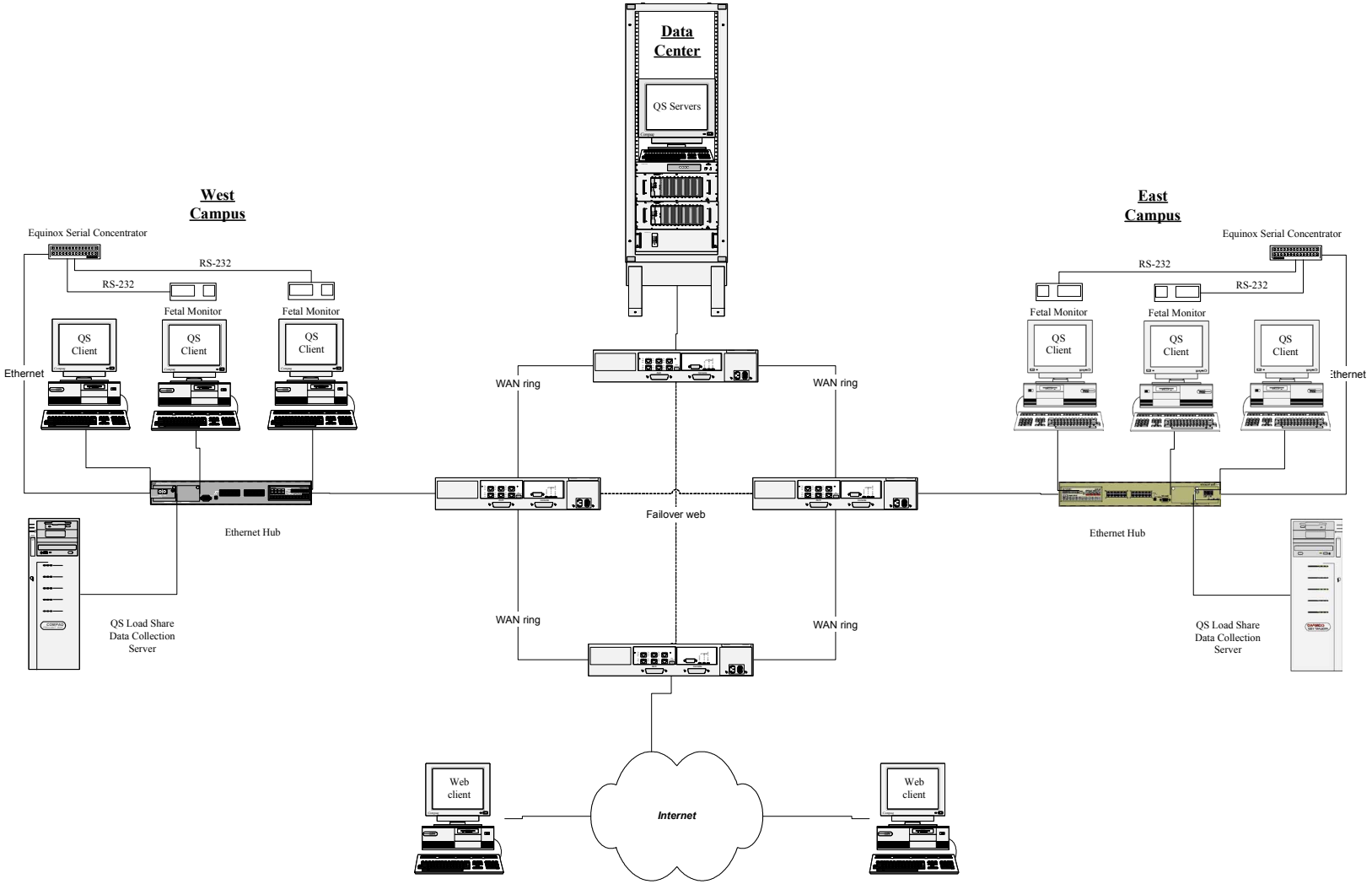

Figure B-8. Surveillance Configuration WAN-Ring

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Appendix C

Fetal Monitor Set-Up

OVERVIEW

The following pages contain information necessary for interfacing fetal monitors with the QS.

LIST OF FETAL MONITORS

Corometrics® 115 ..... C-2
Corometrics® 116 ..... C-4
Corometrics® 118 ..... C-5
Corometrics® 120 Series C-6
Corometrics® 145 ..... C-6
Corometrics® 150 ..... C-6
Corometrics® 151 ..... C-7
Corometrics® 170 Series C-8
Agilent / Hewlett Packard Series 50 (1350, 1351, 1353) C-9
Hewlett Packard 8040 ..... C-10

Corometrics® 115

The information within Table C-1, Table C-2, and Table C-3 reflect the switch settings for the Corometrics® 115 fetal monitor.

The ** symbol in the following tables indicates the required settings for the serial configuration.

Table C-1. Corometrics 115 Dip Switch Settings - Switch SW1

Monitor I.D. For RS-232		
Switch #	**Position**	**Status**
1	OFF	Default **
2	OFF	Default **
3	OFF	Default **
4	OFF	Default **
5	OFF	Default **
Communication Mode		
Switch #	**Position**	**Status**
6	ON	Request **
	OFF	Update
7	ON	No Parity **
	OFF	Parity
8	ON	Odd Parity
	OFF	Even Parity

Table C-2. Corometrics 115 Dip Switch Settings - Switch SW2

RS-232 Speed					
Switch #	**9600 bps**	**4800 bps**	**2400 bps**	**1200 bps**	**300 bps**
1	ON	OFF	ON **	OFF	ON
2	ON	ON	OFF **	OFF	ON
3	ON	ON	ON **	ON	OFF

Table C-3. Corometrics 115 Dip Switch Settings - Switch SW3

Language					
Switch #	**English**	**French***	**German***	**Spanish+**	**Japanese****
1	ON **	OFF	ON	OFF	ON
2	ON **	ON	OFF	OFF	ON
3	ON **	ON	ON	ON	OFF
Communication Options					
Switch #	**No Communications**	**RS-232**	**Corolan**	**Undefined**	
4	ON	OFF **	ON	OFF	
5	ON	ON **	OFF	OFF	
Chart Settings					
Switch #	**Feature**	**Position**	**Status**		
6	CHART SPEED	ON	1-2cm/Min.		
		OFF **	1-3cm/Min.		
7	CHART SCALE	ON **	30-240 BPM		
		OFF	50-210BPM		

* For Single Cardiotach - valid only for 50-210 chart scale.

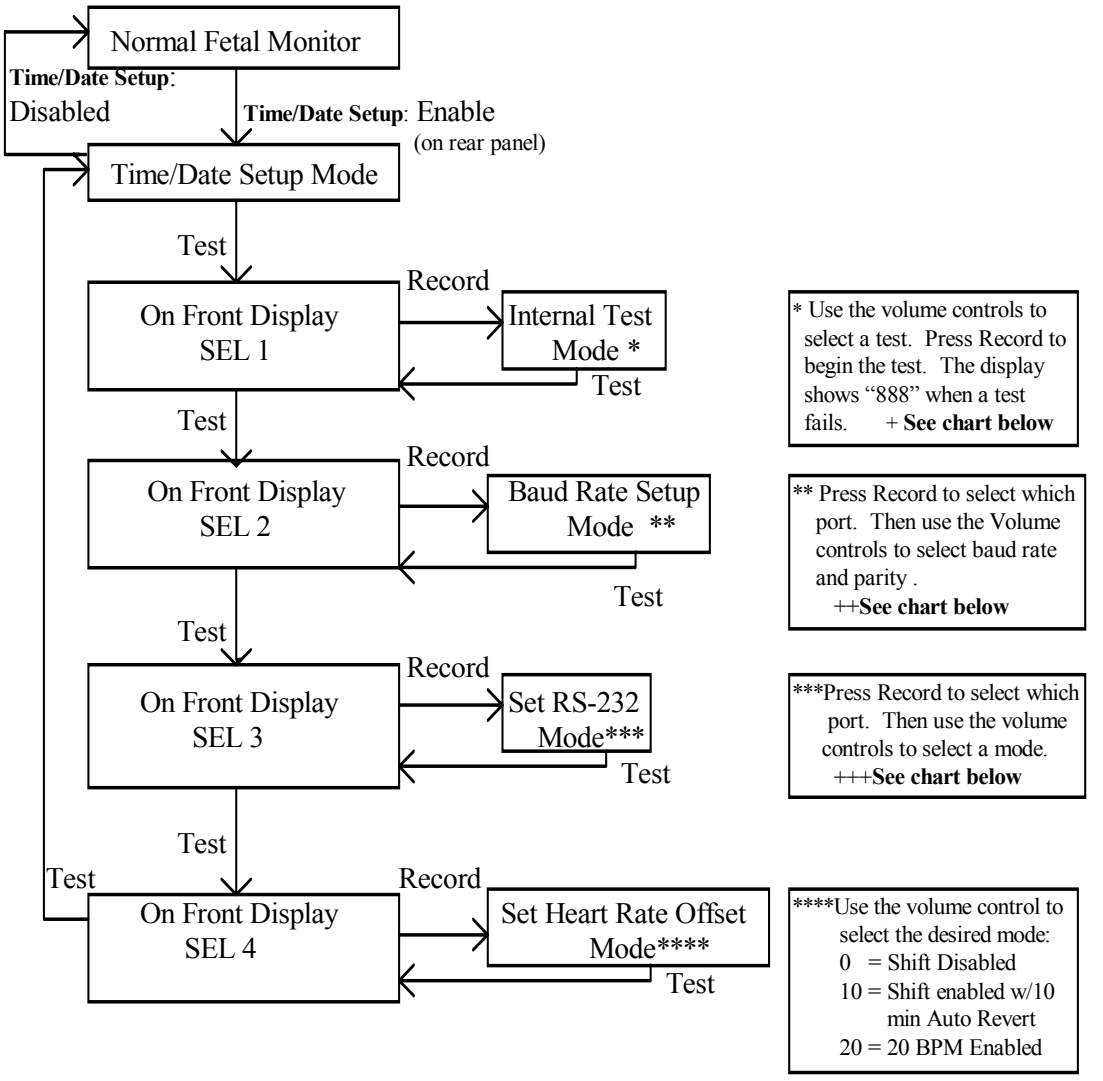
** For Single Cardiotach - valid only for 30-240 chart scale.

\+ For Dual Cardiotach only.

Corometrics® 116

The 116 requires that the baud rate be set at **9600**, and the parity be set to **NONE** in the **SEL2** setup screen and the **RS-232** mode must be set for **1** (115 TX/RX) in the **SEL3** screen.

Use Figure C-1 to aid you in configuring the Corometrics® 116 fetal monitor.



+Internal Test Mode

Test	Function
1	CPU CRC ROM Check
2	Recorder dots check
3	1.2V J102 check
4	1.2V ramp
5	Absolute UA
6	J102 mode lines
7	Dip switch settings
8	Comm., need loopback
9	Strobe with timer
10	Print error log
11	Erase error log

++Baud Rate Setup Mode

Display 1	Baud Rate	Display 2	Parity	Display 3	Port
3	300	0	None	110	J110
6	600	1	Odd	109	J109
12	1200	2	Even		
24	2400				
48	4800				
96	9600				

+++Set RS-232 Mode

Display 1	Mode
0	115 Update
1	115 Tx/Rx
2	ASCII IN
3	Spectra- Tel
4	556, Critikon, Colin
5	555, Nellcor, Ohmeda
6	Datascope
Display 3	**Port**
110	J110
109	J109

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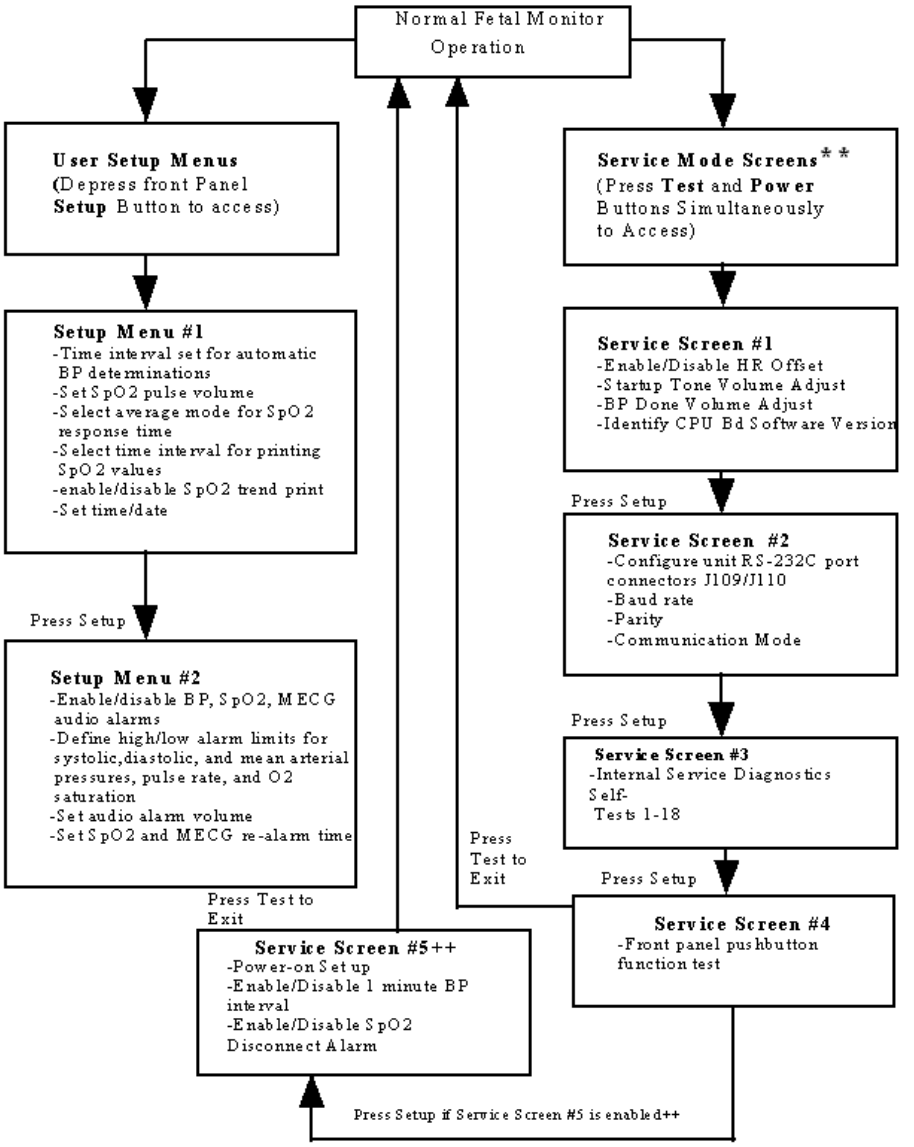
Figure C-1. Corometrics® 116 Set-up

Corometrics® 118

The Corometrics® 118 requires the baud rate to be **9600**, parity set to **NONE**, and the communication mode set to **115 Transmit/Receive**. This will all be set in the **Service Screen** mode, service screen #2. Use Figure C-2 to aid you in this configuration.



Service Mode**	
SW1-2	Front Panel Setup
Off	Unlock
On	Locked

Service Screen #5-Peripheral Board Switch Settings ++

SERVICE SCREEN #5	SW2 5	SW2 6	SW2 7	SW2 8
ENABLED (Defaults selected via Service Mode	OFF	ON	OFF	ON
DISABLED (Factory defaults only)	ANY OTHER SETTING			

Figure C-2. Corometrics® 118 Set-up

Corometrics® 120 Series

1. Power up the fetal monitor and highlight **Setup** on the main screen by turning the trim knob.
2. Press the trim knob.
3. Highlight **Service** on the **General Setup** screen by turning trim knob.
4. Press the trim knob.
5. Enter 4 digit access code (day and month) - example **3111** represents November 31st.
6. Click on last digit of access code (pressing the trim knob) and you will enter the **Service** screen. If the access code does not work, try switching the day and month values.
7. Highlight **Comm** on the **Service** screen.
8. Press the trim knob.
9. Highlight the **baud rate** for the port you are configuring - turn trim knob to cycle through available settings until the desired baud rate (**1200**) is highlighted.
10. Press the trim knob.
11. Highlight the **mode** for the port you are configuring - turn trim knob to cycle through available settings until the desired mode (**1371**) is highlighted.
12. Press the trim knob.
13. Return to the main screen.
14. Switch the monitor **OFF** and then back **ON**.

The selected 1371 protocol Specified" be used with the "Not Specified" and "HP Compatible" settings in the bed configuration in the QS Designer.

Corometrics® 145

An upgrade kit is required for older models without the connector labeled **J102**. If **J102** is present an **0830AAN** interface is required and no configuration of the monitor is needed.

Corometrics® 150

This monitor requires an **0830AAN** interface to communicate with the serial network through the **J102** port. No configuration is required for this monitor.

Corometrics® 151

On older models that only have the **J102** connector an **0830AAN** interface is required to communicate via the serial network. With newer units where **J109** is present, use the the information that follows to configure the **RS-232** port for communication with the QS. The ** indicates settings for QS system

RS232 SETUP

1. Turn unit **OFF**.
2. Turn the monitor **ON** while simultaneously pressing the front panel **Volume Up** and **Down** push buttons. Continue pressing the push buttons until a **1** appears within the **UA** display.
3. After entry into the setup mode, press the **Volume Up** push button twice to display **3** in the UA display window.
4. Activate the **RS-232 setup mode** by pressing the **Record** push button when the **UA** display is **3**. The **Record** LED (light emitting diode) will illuminate.
5. Press the **Record** push button again to deactivate the **RS-232 setup mode** and extinguish the **Record** LED.

Configuration of the RS-232 Port

The number on the **HR** display indicates the type of information given on the **HR2** display. The number on the **HR** display is sequenced with the **UA Reference** push button (wrapping from **3** back to **1**). The **Volume Up** and **Volume Down** push buttons increment/decrement the number appearing within the **HR2** display through the valid possibilities - wrapping around as appropriate. Table C-4 summarizes the RS-232 port settings.

Table C-4. Corometrics® 151 RS-232 Port Configuration Settings

HR DISPLAY	HR2 DISPLAY
1	MODE FOR SELECTED PORT: 0 = Critikon NIBP 1 = Model 555 NIBP 2 = Model 115 Update Mode (output) **
2	BAUD RATE OF SELECTED PORT 3 = 300 Baud 6 = 600 Baud 12 = 1200 Baud 24 = 2400 Baud **
3	PARITY OF SELECTED PORT 0 = No Parity ** 1 = Odd Parity 2 = Even Parity

Pressing the **Record** push button will deactivate the **RS-232 setup mode** and extinguish the **Record** LED. Pressing and releasing the **Paper Advance** push button will then cause the monitor to exit the **setup mode** and begin its normal power on self-test.

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Corometrics® 170 Series

The Corometrics® 170 series monitor has two **RS-232** serial connectors. By default, **Port 1** is configured for connection to the QS. The settings are the same as for the 120 series: **1200 Baud**, and either **1371** or **1371/notes protocol**. This protocol can be used with either the **HP compatible** or the **Not specified** (auto-detect) monitor type in the **Beds** configuration dialog of the QS Designer.

If the default settings have been changed, you can restore them by following the instructions below:

1. Switch the monitor off.

Enter the service mode:

2. Press and hold the **Setup** button
3. Press and hold the blue **Power** button
4. Release both buttons - service mode is now activated.
5. Use the **UA reference** button to toggle between the setup code (shown in the UA display) and the setting or value (shown in the primary FHR display). The UA display is active when the ± qualifier illuminates; the FHR display is active when the heartbeat indicator illuminates.
6. Use the **Volume** buttons to increase or decrease the code, value or setting shown in the active display. Refer to Table C-5 for the service codes. For a **Model 172**, use the left-most set of volume controls.
7. After configuration, press the **Set-up** button to exit the service mode and enter the standby mode.

NOTE

If you press the power button to exit the setup mode, any changes you made will not be stored in memory. You must exit by pressing the setup button in order for the changes to take effect.

Table C-5. Corometrics® 170 Series Service Codes

Code (UA display)		Setting or Value (Primary FHR Display)
Code #	**Code Description**	
22	fetal movement enable/disable	0 = off; 1 = on (if option is installed)
23	language	0 = English; 1 = Spanish; 2 = German; 3 = French; 4 = Japanese; 5 = Italian; 6 = Swedish; 7 = Dutch
24	chart speed	1, 2; or 3 cm/min
25	paper scale	0 = 30-240; 1 = 50-210 (BPM)
30, 40	communications mode (port 1,2)	0 = HP; 1 = HP w/notes; 2 = ext BP; 3 = factory test
31, 41	baud rate (port1, 2)	300; 600; 1200; 2400; 4800; 9600; 19200; 38400
50	remote mark annotation style	0 = FM; 1 = arrow
51	**For Future Use** (Japanese units only)	0 = off; 1 = on
52	fetal heart rate offset enable/disable	0 = off; 1 = 10 minute auto-revert; 2 = on
53	UA reference default	5, 10, 15, 20, 25 (relative units)
100	recorder alignment	0-255

Agilent / Hewlett Packard Series 50 (1350, 1351, 1353)

In order to support the **RS-422** serial interface on the M135XA, the monitors must be at level M135XA-6801G or above on the internal firmware of the monitor. This translates to software version **A.03**. The software version may be determined through the following procedure.

1. Remove transducers from the monitor
2. Press the **F** button and **Test** buttons simultaneously - the display should read **C01**.
3. Press the **F** button until the display reads **A01**.
4. Press the **Toco baseline** key (>|<).
5. The *model number*, *serial number*, and *software revision level* will print on the strip paper.

If it is determined that the monitor does not have version **A.03** or above the **M1360A** upgrade needs to be ordered from **Hewlett Packard**. It is the hospital's responsibility to have the monitor upgraded.

An **RS-422** to **RS-232** converter box (part number **0835AAN**) will need to be attached to these monitors.

Hewlett Packard 8040

This monitor requires an **0832AAN interface box current loop to RS-232 converter**.

Note

All monitors must have the system connection on the rear panel. If the connection is not there the monitor must be upgraded by HP. It is the hospital's responsibility to have the monitor upgraded.

Appendix D

Unity Parameters

OVERVIEW

The following pages provide parameter descriptions and the identity of the corresponding **QS PMS** items for the devices listed in the following paragraph.

LIST OF SUPPORTED DEVICES

Allied Health Care Bear 1000 ..... D-2
Baxter Vigilance D-3
Bird VIP D-4
Datex Capnomac D-5
Dräger Babylog 8000 ..... D-6
Dräger Cato D-7
Dräger Evita D-8
Dräger Evita 2 ..... D-10
Dräger Evita 2 Dura D-12
Dräger Evita 4 ..... D-14
Dräger Julian D-16
Dräger PM8060 ..... D-17
Engstrom Elsa D-18
Hamilton Veolar D-19
Hellige SMU EVO D-20
Nellcor Puritan Bennet Adult Star 950 / 1500 / 2000 ..... D-22
Nellcor Puritan Bennet Infant Star D-23
Nellcor Puritan Bennet Infant Star 500 ..... D-23
Nellcor Puritan Bennet Infant Star 950 ..... D-24
Nellcor Puritan Bennet pb7200 ..... D-25
Sechrist 600APM D-26
Siemens SC 9000 ..... D-27
Servo 300 ..... D-28
Siemens Servo 900 ..... D-29

Allied Health Care Bear 1000

Parametric data for this device is supplied by Table D-1.

Table D-1. Parametric Data - Allied Health Care Bear 1000

Parameter Description	PMS Item
fraction of inspired oxygen	PMS_FIO2
tidal volume	PMS_TIDALVOLUME
peak pressure	PMS_PEAKINSPIRP
plateau pressure	PMS_PLATEAUPR_P
mean airway pressure	PMS_MEANAIRPR_P
sensitivity	PMS_SENSPRES_S
respiratory rate	PMS_RESP2
minute volume	PMS_MINUTEVOLUME
inspiration hold time	PMS_PAUSETIME_S
positive pressure support	PMS_PRESSUP_S
inspiratory time	PMS_INSPTIME_S
Ti:Te ratio denominator	PMS_IERATIO_P
ventilator rate	PMS_RESP_S
flow rate	PMS_PEAKINSPFL_S
primary mode of operation	PMS_VENTMODE_S

Baxter Vigilance

Parametric data for this device is supplied by Table D-2.

Table D-2. Parametric Data - Baxter Vigilance

Parameter Description	PMS Item
signal quality index	-
SvO2	PMS_SvO2
stroke volume resistance	PMS_CCO_SVR
stroke volume resistance index	PMS_CCO_SVRI
bolus cardiac output	PMS_CCO_CO
bolus cardiac output index	PMS_CCO_CI
continuous cardiac output	PMS_CCO_CCO
continuous cardiac output index	PMS_CCO_CCI
blood temperature	PMS_CCO_BLOODT

Bird VIP

Parametric data for this device is supplied by Table D-3.

Table D-3. Parametric Data - Bird VIP

Parameter Description	PMS Item
respiratory rate	PMS_RESP2
peak pressure	PMS_PEAKINSPIRP
mean airway pressure	PMS_MEANAIRPR_P
sensitivity	PMS_SENSPRES_S
positive end-expiratory pressure	PMS_PEEPCPAP_S
hi rate alarm limit	PMS_HIRESPRLMT_S
lo PEEP alarm limit	PMS_LOPEEPLMT_S
lo pressure alarm limit	PMS_LOINSPRLMT_S
lo exhaled min. vol. alarm limit	PMS_LOEXMINLMT_S
lo exhaled tidal vol. alarm limit	PMS_LOEXTVLMT_S
secondary mode of operation	2ND_VENTMODE_S
positive pressure support	PMS_PRESSUP_S
inspiratory time	PMS_INSPTIME_S
Ti:Te ratio denominator	PMS_IERATIO_P
ventilator rate	PMS_RESP_S
flow rate	PMS_PEAKINSPFL_S
primary mode of operation	PMS_VENTMODE_S
apnea time alarm limit	-
tidal volume setting	PMS_TIDALVOLUME_S
measured inspiratory time	PMS_INSP_MEAS
measured peep	PMS_MEAS_PEEP

Datex Capnomac

Parametric data for this device is supplied by Table D-4.

Table D-4. Parametric Data - Datex Capnomac

Parameter Description	PMS Item
expired sevoflurane	
inspired sevoflurane	
expired desflurane	
inspired desflurane	
expired isoflurane	
inspired isoflurane	
expired halothane	
inspired halothane	
expired N2O	
inspired N2O	
expired CO2	PMS_ETCO2
inspired CO2	PMS_IMCO2
expired O2	PMS_OXYGEN_EXP
inspired O2	PMS_OXYGEN_INSP
expired enflurane	
inspired enflurane	

Dräger Babylog 8000

Parametric data for this device is supplied by Table D-5

Table D-5. Parametric Data - Dräger Babylog 8000

Parameter Description	PMS Item
fraction of inspired oxygen	PMS_FIO2
tidal volume	PMS_TIDALVOLUME
peak pressure	PMS_PEAKINSPIRP
mean airway pressure	PMS_MEANAIRPR_P
respiratory rate	PMS_RESP2
positive end-expiratory pressure	PMS_PEEPCPAP_S
minute volume	PMS_MINUTEVOLUME
lo exhaled minute volume alarm limit	PMS_LOEXMINLMT_S
hi minute volume alarm limit	-
inspiratory time	PMS_INSPTIME_S
ventilator rate	PMS_RESP_S
flow rate	PMS_PEAKINSPFL_S
apnea time alarm limit	-
pressure control pressure setting	PMS_CONTPRES_S
Ti:Te ratio denominator setting	PMS_IERATIO_S
fraction of inspired oxygen setting	PMS_FIO2_S
measured PEEP	PMS_MEAS_PEEP
secondary mode of operation	2ND_VENTMODE_S
primary mode of operation	PMS_VENTMODE_S

Dräger Cato

Parametric data for this device is supplied by Table D-6

Table D-6. Parametric Data - Dräger Cato

Parameter Description	PMS Item
expired O2	PMS_OXYGEN_EXP
inspired O2	PMS_OXYGEN_INSP
expired CO2	PMS_ETCO2
inspired CO2	PMS_IMCO2
CO2-derived respiration rate	PMS_ETCO2RESP
fraction of inspired oxygen	PMS_FIO2
tidal volume	PMS_TIDALVOLUME
peak pressure	PMS_PEAKINSPIRP
plateau pressure	PMS_PLATEAUPR_P
mean airway pressure	PMS_MEANAIRPR_P
respiratory rate	PMS_RESP2
minute volume	PMS_MINUTEVOLUME
hi peak insp pressure alarm limit	PMS_HIPRESLMT_S
lo pressure alarm limit	PMS_LOINSPRLMT_S
lo exhaled minute volume alarm lim	PMS_LOEXMINLMT_S
hi minute volume alarm limit	-
secondary mode of operation	2ND_VENTMODE_S
inspiratory percent	PMS_INSP_PCT
ventilator rate	PMS_RESP_S
primary mode of operation	PMS_VENTMODE_S
tidal volume setting	PMS_TIDALVOLUME_S
pressure control pressure setting	PMS_CONTPRES_S
compliance	PMS_CMP
measured peep	PMS_MEAS_PEEP

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Dräger Evita

Parametric data for this device is supplied by Table D-7

Table D-7. Parametric Data - Dräger Evita

Parameter Description	PMS Item
hi rate alarm limit	PMS_HIRESPRLMT_S
intrinsic peep	PMS_INTRIN_PEEP
fraction of inspired oxygen	PMS_FIO2
tidal volume	PMS_TIDALVOLUME
peak pressure	PMS_PEAKINSPIRP
plateau pressure	PMS_PLATEAUPR_P
mean airway pressure	PMS_MEANAIRPR_P
respiratory rate	PMS_RESP2
positive end-expiratory pressure	PMS_PEEPCPAP_S
minute volume	PMS_MINUTEVOLUME
lo exhaled minute volume alarm limit	PMS_LOEXMINLMT_S
hi minute volume alarm limit	-
positive pressure support	PMS_PRESSUP_S
ventilator rate	PMS_RESP_S
flow rate	PMS_PEAKINSPFL_S
apnea time alarm limit	-
spontaneous minute volume	PMS_SPONMINVOL_P
tidal volume setting	PMS_TIDALVOLUME_S
pressure control pressure setting	PMS_CONTPRES_S
Ti:Te ratio denominator setting	PMS_IERATIO_S
flow trigger setting	PMS_FLOW_TRIGGER
fraction of inspired oxygen setting	PMS_FIO2_S
ASB ramp time	PMS_ASB_RAMP
APRV high time	PMS_APRV_HI_TIME
compliance	PMS_CMP
resistance	PMS_RE
measured PEEP	PMS_MEAS_PEEP
spontaneous respiration rate	PMS_RESP_SPONT
APRV low pressure	PMS_APRV_LO_PRES

Table D-7. Parametric Data - Dräger Evita

Parameter Description	PMS Item
APRV high pressure	PMS_APRV_HI_PRES
APRV low time	PMS_APRV_LO_TIME
secondary mode of operation	2ND_VENTMODE_S
primary mode of operation	PMS_VENTMODE_S

Dräger Evita 2

Parametric data for this device is supplied by Table D-8

Table D-8. Parametric Data - Dräger Evita 2

Parameter Description	PMS Item
respiratory rate	PMS_RESP2
peak pressure	PMS_PEAKINSPIRP
tidal volume	PMS_TIDALVOLUME
fraction of inspired oxygen	PMS_FIO2
minute volume	PMS_MINUTEVOLUME
mean airway pressure	PMS_MEANAIRPR_P
positive end-expiratory pressure	PMS_PEEPCPAP_S
plateau pressure	PMS_PLATEAUPR_P
ventilator rate	PMS_RESP_S
compliance	PMS_CMP
resistance	PMS_RE
Ti:Te ratio denominator setting	PMS_IERATIO_S
flow rate	PMS_PEAKINSPFL_S
tidal volume setting	PMS_TIDALVOLUME_S
measured PEEP	PMS_MEAS_PEEP
pressure control pressure setting	PMS_CONTPRES_S
flow trigger setting	PMS_FLOW_TRIGGER
spontaneous minute volume	PMS_SPONMINVOL_P
positive pressure support	PMS_PRESSUP_S
fraction of inspired oxygen setting	PMS_FIO2_S
ASB ramp time	PMS_ASB_RAMP
APRV low pressure	PMS_APRV_LO_PRES
APRV high pressure	PMS_APRV_HI_PRES
APRV low time	PMS_APRV_LO_TIME
APRV high time	PMS_APRV_HI_TIME
spontaneous respiration rate	PMS_RESP_SPONT
intrinsic peep	PMS_INTRIN_PEEP
hi rate alarm limit	PMS_HIRESPRLMT_S
lo exhaled minute volume alarm limit	PMS_LOEXMINLMT_S

Table D-8. Parametric Data - Dräger Evita 2

Parameter Description	PMS Item
hi minute volume alarm limit	-
apnea time alarm limit	-
expired CO2	PMS_ETCO2
primary mode of operation	PMS_VENTMODE_S
secondary mode of operation	2ND_VENTMODE_S

Dräger Evita 2 Dura

Parametric data for this device is supplied by Table D-9

Table D-9. Parametric Data - Dräger Evita 2 Dura

Parameter Description	PMS Item
respiratory rate	PMS_RESP2
peak pressure	PMS_PEAKINSPIRP
tidal volume	PMS_TIDALVOLUME
fraction of inspired oxygen	PMS_FIO2
minute volume	PMS_MINUTEVOLUME
mean airway pressure	PMS_MEANAIRPR_P
positive end-expiratory pressure	PMS_PEEPCPAP_S
plateau pressure	PMS_PLATEAUPR_P
ventilator rate	PMS_RESP_S
compliance	PMS_CMP
resistance	PMS_RE
Ti:Te ratio denominator setting	PMS_IERATIO_S
flow rate	PMS_PEAKINSPFL_S
tidal volume setting	PMS_TIDALVOLUME_S
measured PEEP	PMS_MEAS_PEEP
pressure control pressure setting	PMS_CONTPRES_S
flow trigger setting	PMS_FLOW_TRIGGER
spontaneous minute volume	PMS_SPONMINVOL_P
positive pressure support	PMS_PRESSUP_S
fraction of inspired oxygen setting	PMS_FIO2_S
ASB ramp time	PMS_ASB_RAMP
APRV low pressure	PMS_APRV_LO_PRES
APRV high pressure	PMS_APRV_HI_PRES
APRV low time	PMS_APRV_LO_TIME
APRV high time	PMS_APRV_HI_TIME
spontaneous respiration rate	PMS_RESP_SPONT
intrinsic peep	PMS_INTRIN_PEEP
hi rate alarm limit	PMS_HIRESPRLMT_S
lo exhaled minute volume alarm limit	PMS_LOEXMINLMT_S

Table D-9. Parametric Data - Dräger Evita 2 Dura

Parameter Description	PMS Item
hi minute volume alarm limit	-
apnea time alarm limit	-
hi tidal volume alarm limit	-
inspiratory time	PMS_INSPTIME_S
expired CO2	PMS_ETCO2
primary mode of operation	PMS_VENTMODE_S
secondary mode of operation	2ND_VENTMODE_S

Dräger Evita 4

Parametric data for this device is supplied by Table D-10

Table D-10. Parametric Data - Dräger Evita 4

Parameter Description	PMS Item
respiratory rate	PMS_RESP2
peak pressure	PMS_PEAKINSPIRP
tidal volume	PMS_TIDALVOLUME
fraction of inspired oxygen	PMS_FIO2
minute volume	PMS_MINUTEVOLUME
mean airway pressure	PMS_MEANAIRPR_P
positive end-expiratory pressure	PMS_PEEPCPAP_S
plateau pressure	PMS_PLATEAUPR_P
ventilator rate	PMS_RESP_S
compliance	PMS_CMP
resistance	PMS_RE
Ti:Te ratio denominator setting	PMS_IERATIO_S
flow rate	PMS_PEAKINSPFL_S
tidal volume setting	PMS_TIDALVOLUME_S
measured PEEP	PMS_MEAS_PEEP
pressure control pressure setting	PMS_CONTPRES_S
flow trigger setting	PMS_FLOW_TRIGGER
spontaneous minute volume	PMS_SPONMINVOL_P
positive pressure support	PMS_PRESSUP_S
fraction of inspired oxygen setting	PMS_FIO2_S
ASB ramp time	PMS_ASB_RAMP
APRV low pressure	PMS_APRV_LO_PRES
APRV high pressure	PMS_APRV_HI_PRES
APRV low time	PMS_APRV_LO_TIME
APRV high time	PMS_APRV_HI_TIME
spontaneous respiration rate	PMS_RESP_SPONT
intrinsic peep	PMS_INTRIN_PEEP
hi rate alarm limit	PMS_HIRESPRLMT_S
lo exhaled minute volume alarm limit	PMS_LOEXMINLMT_S

Table D-10. Parametric Data - Dräger Evita 4

Parameter Description	PMS Item
hi minute volume alarm limit	-
apnea time alarm limit	-
hi tidal volume alarm limit	-
inspiratory time	PMS_INSPTIME_S
expired CO2	PMS_ETCO2
primary mode of operation	PMS_VENTMODE_S
secondary mode of operation	2ND_VENTMODE_S

Dräger Julian

Parametric data for this device is supplied by Table D-11

Table D-11. Parametric Data - Dräger Julian

Parameter Description	PMS Item
respiratory rate	PMS_RESP2
minute volume	PMS_MINUTEVOLUME
fraction of inspired oxygen	PMS_FIO2
fraction of inspired oxygen setting	PMS_FIO2_S
ventilator rate	PMS_RESP_S
plateau pressure	PMS_PLATEAUPR_P
peak pressure	PMS_PEAKINSPIRP
mean airway pressure	PMS_MEANAIRPR_P
tidal volume	PMS_TIDALVOLUME
tidal volume setting	PMS_TIDALVOLUME_S
flow rate	PMS_PEAKINSPFL_S
Ti:Te ratio denominator setting	PMS_IERATIO_S
pressure control pressure setting	PMS_CONTPRES_S
measured peep	PMS_MEAS_PEEP
compliance	PMS_CMP
inspired O2	PMS_OXYGEN_INSP
expired O2	PMS_OXYGEN_EXP
CO2-derived respiration rate	PMS_ETCO2RESP
inspired CO2	PMS_IMCO2
expired CO2	PMS_ETCO2
primary mode of operation	PMS_VENTMODE_S
secondary mode of operation	2ND_VENTMODE_S
hi peak insp pressure alarm limit	PMS_HIPRESLMT_S
lo pressure alarm limit	PMS_LOINSPRLMT_S
lo exhaled minute volume alarm lim	PMS_LOEXMINLMT_S
hi minute volume alarm limit	-

Dräger PM8060

Parametric data for this device is supplied by Table D-12

Table D-12. Parametric Data - Dräger PM8060

Parameter Description	PMS Item
respiratory rate	PMS_RESP2
minute volume	PMS_MINUTEVOLUME
fraction of inspired oxygen	PMS_FIO2
plateau pressure	PMS_PLATEAUPR_P
peak pressure	PMS_PEAKINSPIRP
mean airway pressure	PMS_MEANAIRPR_P
tidal volume	PMS_TIDALVOLUME
measured peep	PMS_MEAS_PEEP
compliance	PMS_CMP
inspired O2	PMS_OXYGEN_INSP
expired O2	PMS_OXYGEN_EXP
CO2-derived respiration rate	PMS_ETCO2RESP
inspired CO2	PMS_IMCO2
expired CO2	PMS_ETCO2
primary mode of operation	PMS_VENTMODE_S
secondary mode of operation	2ND_VENTMODE_S
hi peak insp pressure alarm limit	PMS_HIPRESLMT_S
lo pressure alarm limit	PMS_LOINSPRLMT_S
lo exhaled minute volume alarm lim	PMS_LOEXMINLMT_S
hi minute volume alarm limit	-

Engstrom Elsa

Parametric data for this device is supplied by Table D-13

Table D-13. Parametric Data - Engstrom Elsa

Parameter Description	PMS Item
respiratory rate	PMS_RESP2
peak pressure	PMS_PEAKINSPIRP
tidal volume	PMS_TIDALVOLUME
fraction of inspired oxygen	PMS_FIO2
minute volume	PMS_MINUTEVOLUME
positive end-expiratory pressure	PMS_PEEPCPAP_S
ventilator rate	PMS_RESP_S
Ti:Te ratio denominator setting	PMS_IERATIO_S
expired sevoflurane	
inspired sevoflurane	
expired desflurane	
inspired desflurane	
expired isoflurane	
inspired isoflurane	
expired halothane	
inspired halothane	
expired N2O	
inspired N2O	
expired CO2	PMS_ETCO2
inspired CO2	PMS_IMCO2
primary mode of operation	PMS_VENTMODE_S

Hamilton Veolar

Parametric data for this device is supplied by Table D-14

Table D-14. Parametric Data - Hamilton Veolar

Parameter Description	PMS Item
respiratory rate	PMS_RESP2
positive end-expiratory pressure	PMS_PEEPCPAP_S
minute volume	PMS_MINUTEVOLUME
fraction of inspired oxygen	PMS_FIO2
ventilator rate	PMS_RESP_S
tidal volume	PMS_TIDALVOLUME
plateau pressure	PMS_PLATEAUPR_P
peak pressure	PMS_PEAKINSPIRP
mean airway pressure	PMS_MEANAIRPR_P
sensitivity	PMS_SENSPRES_S
positive pressure support	PMS_PRESSUP_S
flow rate	PMS_PEAKINSPFL_S
inspiratory percent	PMS_INSP_PCT
Ti:Te ratio denominator	PMS_IERATIO_P
measured peep	PMS_MEAS_PEEP
primary mode of operation	PMS_VENTMODE_S

Hellige SMU EVO

Parametric data for this device is supplied by Table D-15

Table D-15. Parametric Data - Hellige SMU EVO

Parameter Description	PMS Item
ECG heart rate	PMS_HR
ECG PVC count for the last minute	PMS_VPB
resp. rate	PMS_RESP
BP mean	
BP systolic	
BP diastolic	
PA wedge pressure (episodic)	
wedge pressure time stamp	
NBP mean	PMS_NBPMEA
NBP systolic	PMS_NBPSYS
NBP diastolic	PMS_NBPDIA
NBP time stamp	-
SpO2 saturation	
SpO2 rate	
temperature site 1	
temperature site 2	
blood temperature	PMS_BLOODT
Instantaneous cardiac output	-
time stamp of last CO (UNIX_TIME)	-
inspired CO2	PMS_IMCO2
expired CO2	PMS_ETCO2
inspired O2	
expired O2	
inspired Halothane	
expired Halothane	
inspired Enflurane	
expired Enflurane	
inspired Isoflurane	
expired Isoflurane	

Table D-15. Parametric Data - Hellige SMU EVO

Parameter Description	PMS Item
inspired N2O	
expired N2O	
PtcCO2	PMS_TCO2M_PTCO2
PtcO2	PMS_TCO2M_PTO2
total heater power	PMS_TCO2M_POWER

Nellcor Puritan Bennet Adult Star 950 / 1500 / 2000

Parametric data for this device is supplied by Table D-16

Table D-16. Parametric Data - Nellcor Puritan Bennet Adult Star 950 / 1500 / 2000

Parameter Description	PMS Item
fraction of inspired oxygen	PMS_FIO2
tidal volume	PMS_TIDALVOLUME
peak pressure	PMS_PEAKINSPIRP
plateau pressure	PMS_PLATEAUPR_P
mean airway pressure	PMS_MEANAIRPR_P
sensitivity	PMS_SENSPRES_S
respiratory rate	PMS_RESP2
positive end-expiratory pressure	PMS_PEEPCPAP_S
minute volume	PMS_MINUTEVOLUME
inspiration hold time	PMS_PAUSETIME_S
secondary mode of operation	2ND_VENTMODE_S
positive pressure support	PMS_PRESSUP_S
inspiratory time	PMS_INSPTIME_S
Ti:Te ratio denominator	PMS_IERATIO_P
ventilator rate	PMS_RESP_S
flow rate	PMS_PEAKINSPFL_S
primary mode of operation	PMS_VENTMODE_S
spontaneous minute volume	PMS_SPONMINVOL_P
tidal volume setting	PMS_TIDALVOLUME_S
pressure control pressure setting	PMS_CONTPRES_S

Nellcor Puritan Bennet Infant Star

Parametric data for this device is supplied by Table D-17

Table D-17. Parametric Data - Nellcor Puritan Bennet Infant Star

Parameter Description	PMS Item
fraction of inspired oxygen	PMS_FIO2
peak pressure	PMS_PEAKINSPIRP
mean airway pressure	PMS_MEANAIRPR_P
positive end-expiratory pressure	PMS_PEEPCPAP_S
inspiratory time	PMS_INSPTIME_S
ventilator rate	PMS_RESP_S
flow rate	PMS_PEAKINSPFL_S
primary mode of operation	PMS_VENTMODE_S
secondary mode of operation	2ND_VENTMODE_S
Ti:Te ratio denominator setting	PMS_IERATIO_S
HFV flow setting	PMS_HF_FLOW
HFV rate setting	PMS_HF_RR
HFV peak-to-peak pressure setting	PMS_HF_PRES

Nellcor Puritan Bennet Infant Star 500

Parametric data for this device is supplied by Table D-18

Table D-18. Parametric Data - Nellcor Puritan Bennet Infant Star 500

Parameter Description	PMS Item
fraction of inspired oxygen	PMS_FIO2
peak pressure	PMS_PEAKINSPIRP
mean airway pressure	PMS_MEANAIRPR_P
positive end-expiratory pressure	PMS_PEEPCPAP_S
inspiratory time	PMS_INSPTIME_S
ventilator rate	PMS_RESP_S
flow rate	PMS_PEAKINSPFL_S
primary mode of operation	PMS_VENTMODE_S
Ti:Te ratio denominator setting	PMS_IERATIO_S

Nellcor Puritan Bennet Infant Star 950

Parametric data for this device is supplied by Table D-19

Table D-19. Parametric Data - Nellcor Puritan Bennet Infant Star 950

Parameter Description	PMS Item
fraction of inspired oxygen	PMS_FIO2
peak pressure	PMS_PEAKINSPIRP
mean airway pressure	PMS_MEANAIRPR_P
positive end-expiratory pressure	PMS_PEEPCPAP_S
secondary mode of operation	2ND_VENTMODE_S
inspiratory time	PMS_INSPTIME_S
ventilator rate	PMS_RESP_S
flow rate	PMS_PEAKINSPFL_S
primary mode of operation	PMS_VENTMODE_S
Ti:Te ratio denominator setting	PMS_IERATIO_S
HFV flow setting	PMS_HF_FLOW
HFV rate setting	PMS_HF_RR
HFV peak-to-peak pressure setting	PMS_HF_PRES

Nellcor Puritan Bennet pb7200

Parametric data for this device is supplied by Table D-20

Table D-20. Parametric Data - Nellcor Puritan Bennet pb7200

Parameter Description	PMS Item
fraction of inspired oxygen	PMS_FIO2
tidal volume	PMS_TIDALVOLUME
peak pressure	PMS_PEAKINSPIRP
plateau pressure	PMS_PLATEAUPR_P
mean airway pressure	PMS_MEANAIRPR_P
sensitivity	PMS_SENSPRES_S
respiratory rate	PMS_RESP2
positive end-expiratory pressure	PMS_PEEPCPAP_S
minute volume	PMS_MINUTEVOLUME
hi rate alarm limit	PMS_HIRESPRLMT_S
lo PEEP alarm limit	PMS_LOPEEPLMT_S
hi peak inspiratory pres. alarm limit	PMS_HIPRESLMT_S
lo pressure alarm limit	PMS_LOINSPRLMT_S
lo exhaled min. vol. alarm limit	PMS_LOEXMINLMT_S
lo exhaled tidal vol. alarm limit	PMS_LOEXTVLMT_S
inspiration hold time	PMS_PAUSETIME_S
positive pressure support	PMS_PRESSUP_S
inspiratory time	PMS_INSPTIME_S
Ti:Te ratio denominator	PMS_IERATIO_P
ventilator rate	PMS_RESP_S
flow rate	PMS_PEAKINSPFL_S
primary mode of operation	PMS_VENTMODE_S
spontaneous minute volume	PMS_SPONMINVOL_P
tidal volume setting	PMS_TIDALVOLUME_S
pressure control pressure setting	PMS_CONTPRES_S
Ti:Te ratio denominator setting	PMS_IERATIO_S
base flow setting	PMS_BASEFLOW_S
flow trigger setting	PMS_FLOW_TRIGGER
static resistance	PMS_STATLUNGR_P

Table D-20. Parametric Data - Nellcor Puritan Bennet pb7200

Parameter Description	PMS Item
dynamic compliance	PMS_DYNLUNGC_P
dynamic resistance	PMS_DYNLUNGR_P
total PEEP	PMS_PEEP_P
auto PEEP	PMS_AUTO_PEEP
static compliance	PMS_STATLUNGC_P

Sechrist 600APM

Parametric data for this device is supplied by Table D-21

Table D-21. Parametric Data - Sechrist 600APM

Parameter Description	PMS Item
peak pressure	PMS_PEAKINSPIRP
mean airway pressure	PMS_MEANAIRPR_P
respiratory rate	PMS_RESP2
positive end-expiratory pressure	PMS_PEEPCPAP_S
inspiratory time	PMS_INSPTIME_S
Ti:Te ratio denominator	PMS_IERATIO_P
primary mode of operation	PMS_VENTMODE_S

Siemens SC 9000

Parametric data for this device is supplied by Table D-22

Table D-22. Parametric Data - Siemens SC 9000

Parameter Description	PMS Item
ECG heart rate	PMS_HR
ECG PVC count for the last minute	PMS_VPB
ECG lead 1 ST	
ECG lead 2 ST	
ECG lead 3 ST	
ECG lead V ST	
ECG lead Vp ST	
ECG lead AVR ST	
ECG lead AVL ST	
ECG lead AVF ST	
Resp rate	
bp mean	
bp systolic	
bp diastolic	
pa wedge pressure (episodic)	
Wedge pressure time stamp	
nbp mean	PMS_NBPMEA
nbp systolic	PMS_NBPSYS
NBP diastolic	PMS_NBPDIA
NBP time stamp	
spo2 saturation	
spo2 rate	
temperature site 1	
temperature site 2	
delta temp	
svo2 saturation	PMS_SvO2
saturation value for sao2	
blood temperature	
injectate temperature	PMS_TI

Table D-22. Parametric Data - Siemens SC 9000

Parameter Description	PMS Item
time stamp of the last CO	
last average CO reading	PMS_CO
inspired co2	PMS_IMCO2
expired co2	PMS_ETCO2
co2-derived respiration rate	PMS_ETCO2RESP

Servo 300

Parametric data for this device is supplied by Table D-23

Table D-23. Parametric Data - Servo 300

Parameter Description	PMS Item
respiratory rate	PMS_RESP2
minute volume	PMS_MINUTEVOLUME
fraction of inspired oxygen	PMS_FIO2
tidal volume	PMS_TIDALVOLUME
plateau pressure	PMS_PLATEAUPR_P
peak pressure	PMS_PEAKINSPIRP
mean airway pressure	PMS_MEANAIRPR_P

Siemens Servo 900

Parametric data for this device is supplied by Table D-24

Table D-24. Parametric Data - Siemens Servo 900

Parameter Description	PMS Item
respiratory rate	PMS_RESP2
minute volume	PMS_MINUTEVOLUME
fraction of inspired oxygen	PMS_FIO2
tidal volume	PMS_TIDALVOLUME
plateau pressure	PMS_PLATEAUPR_P
peak pressure	PMS_PEAKINSPIRP
mean airway pressure	PMS_MEANAIRPR_P

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Appendix E

QS & Other Documents

This appendix lists a number of additional publications that may help you in understanding and supporting the QS system. Unless noted otherwise, all publications mentioned here are in English.

QS DOCUMENTATION

Archive Conversion Tool Manual, Revision C ..... GE P/N 2002033-003

Birthlogs & Data Reports user Guide, Revision B ..... GE P/N 2002033-017

Configuration Reference Manual for System Managers, Revision E ..... GE P/N 08046-002-QMI

Connection Manager Manual, Revision C ..... GE P/N 2002033-007

Inbound Interface Specification (HIS & HL7), Revision C ..... GE P/N 08021-001-QMI

Outbound Interface Specification (HIS & HL7), Revision B ..... GE P/N 2006710-001

Patient Care Manual For System Managers & Users, Revision E ..... GE P/N 2002033-006

Quick Start Configuration Guide, Revision C ..... GE P/N 2002033-002

Surveillance Configuration Guide, Revision E ..... GE P/N 2002033-005

Surveillance Only User Guide, Revision B ..... GE P/N 2002033-018

Note

The publications listed with their ISBN are issued by third-party publishers or vendors. GE neither makes nor implies any warranty regarding any of these publications or their associated products.

WINDOWS NT & WINDOWS 2000

Windows 2000 Professional MCSE Training Kit ..... ISBN 1-57231-901-1

NETWORKING

Cisco Internetworking Technologies Handbook ..... ISBN 1-58705-001-3

Microsoft Encyclopedia of Networking ..... ISBN 0-7356-0573-4

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